
SPERRY
S-F-310-120-0037669-032886 M
7886-00
DOS 3.1
BASIC 3.0
(DISK 1 of 2)
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S-F-310-120-0034431-032886 U
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DOS 3.1
BASIC 3.0
(DISK 2 of 2)
SPERRY
S-F-310-125-0046573-032886 X
8868-00
DIAGNOSTIC 3.1
SPERRY

SPERRY

PC/IT PERSONAL COMPUTER SYSTEM

Installation Guide

Personal Computer Library
UP-11700 Rev. 2

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WARNING: This equipment has been certified to comply with the limits for a Class B computing device, pursuant to Subpart J of Part 15 of FCC Rules. Only peripherals (computer input/output devices, terminals, printers, etc.) certified to comply with the Class B limits may be attached to this computer. Operation with non-certified peripherals is likely to result in interference to radio and TV reception.

This equipment generates and uses radio frequency energy and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio and television reception. It has been type tested and found to comply with the limits for a Class B computing device in accordance with the specifications in Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception, correct the interference by one or more of the following measures:

- Reorient the receiving antenna
- Relocate the computer with respect to the receiver
- Move the computer away from the receiver
- Plug the computer into a different outlet so that computer and receiver are on different branch circuits
- Ensure that board mounting screws and connector attachment screws are tightly secured
- Ensure that connector panel slot covers are in place when no board is installed

If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions. The user may find the following booklet prepared by the Federal Communications Commission helpful:

"How to Identify and Resolve Radio-TV Interference Problems"

This booklet is available from the U.S. Government Printing Office, Washington, DC 20402, Stock No. 004-000-00345-4.

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SPERRY
SUPPORT
CENTER

Dear Customer,

Welcome to the growing family of SPERRY Personal Computer (PC) users.

The enclosed documentation provides step-by-step instructions for unpacking, installing, and verifying basic operation of your PC system. As an added service, the Sperry Support Center provides a toll-free number for your use if you have any difficulty with the installation or operation of your equipment. The toll-free number of the Sperry Support Center is:

In Continental U.S.	(800) 328-1015
In Canada	Contact your dealer or sales representative
Call between:	8:00 a.m. and 8:00 p.m. Eastern time 7:00 a.m. and 7:00 p.m. Central time 6:00 a.m. and 6:00 p.m. Mountain time 5:00 a.m. and 5:00 p.m. Pacific time
	Monday through Friday, excluding holidays.

Specialists will be available to provide assistance and information relating to the installation, configuration, and operation of your Sperry Personal Computer. They will also answer installation questions about application software packages purchased from or supported by Sperry, and can provide information regarding available service options.

700108-001

Contents

Chapter 2. General Information

2.1. Before You Begin

This chapter provides information on the components you should have, the tools you will need, and questions you will have to answer before you can complete the actual installation process. This chapter also helps you locate various components in the system unit, instructs you on microswitch setting, and explains how to identify, handle, and install boards.

Chapter 3 details the actual installation procedures.

Components

After you have unpacked each of the components of the system, you should have:

- System unit
- System unit power cord
- Display monitor
- Display monitor controller board (that goes inside the system unit)
- Other optional controller or memory boards (that go inside the system unit)
- Keyboard
- Two system unit keys (taped on the back of the system unit)
- Optional memory chips (that go inside the system unit)
- Any peripherals you plan to add to your system (for example, a printer, diskette or fixed-disk drive)
- Optional special cables for connecting devices
- Documentation
- Diskettes

Record the key number in case additional keys need to be ordered. Store the spare key and key number in a safe place.

Tools

The following tools are required to perform the installation:

- Small flat-blade screwdriver
- Phillips screwdriver
- Ballpoint pen

Things You Need To Know

The following questions should be answered during installation. The answers will help you configure your system according to the instructions in Chapter 4.

- What type of display monitor are you installing?

  Monochrome
  Medium-resolution color
  High-resolution color

- If a color monitor, will you be using 40 or 80 characters per line?
- Do you have one or two diskette drives and of what type (see section 11.1)?

  HD type, 1.2M bytes (96 tracks per inch)
  2D type, 360K bytes (48 tracks per inch)

- How many fixed-disk drives do you have? What is the disk drive identification number (as explained in section 11.1)?
- How much optional memory do you have to install?

  Memory chips
  One or two memory expansion boards

- What other options need to be installed at this time?

2.2. Identifying System Unit Components

Figure 2-1 identifies the features of the system unit rear panel.

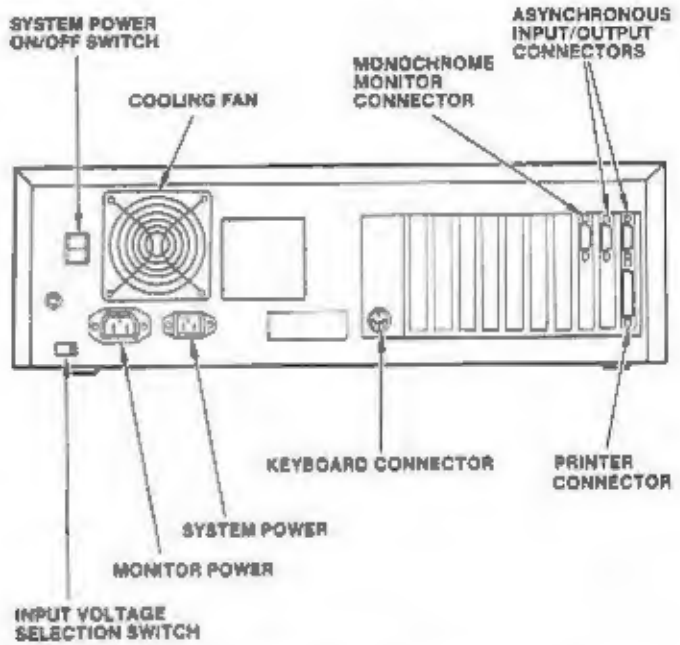


Figure 2-1. System Unit Rear Panel Features

Use of most of the switches and connectors is explained in Chapter 3.

A subsystem board is standard in the system unit. It provides the following three connections:

- One 25-pin parallel printer port connection. Printer installation is covered in printer documentation.
- Two 9-pin RS-232-C serial port connections. These two ports may be used to connect any asynchronous (serial) device (e.g., printers, modems, or terminals). In multiuser systems two terminals can connect to the system unit either directly or via modems.

Once you have removed the system unit cover (section 3.2), Figure 2–2 will help you locate the various components inside the system unit. The metal frame of the system unit is called the chassis.

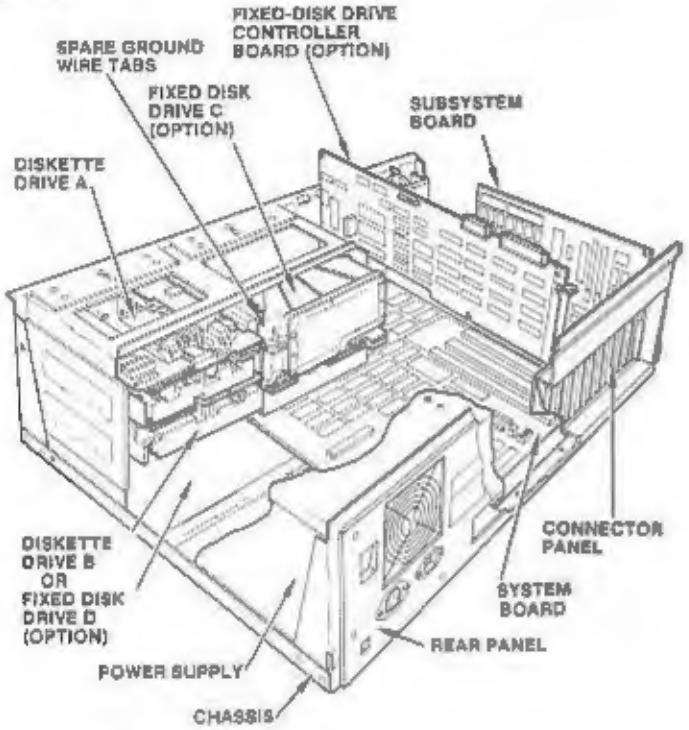


Figure 2–2. System Unit With Cover Removed

Figure 2–3 identifies connectors, switch SW1, jumper plug JP2, and chip sockets on the system board (the floor of the system unit). The connectors into which the controller boards are inserted are also shown in Figure 2–3.

System board switch SW1 may be in either of two locations. Location 1 is accessable only with the system unit cover removed. Location 2 is accessable through an opening in the system unit rear panel which is covered by a small plate. The function of SW1 is the same in either case.

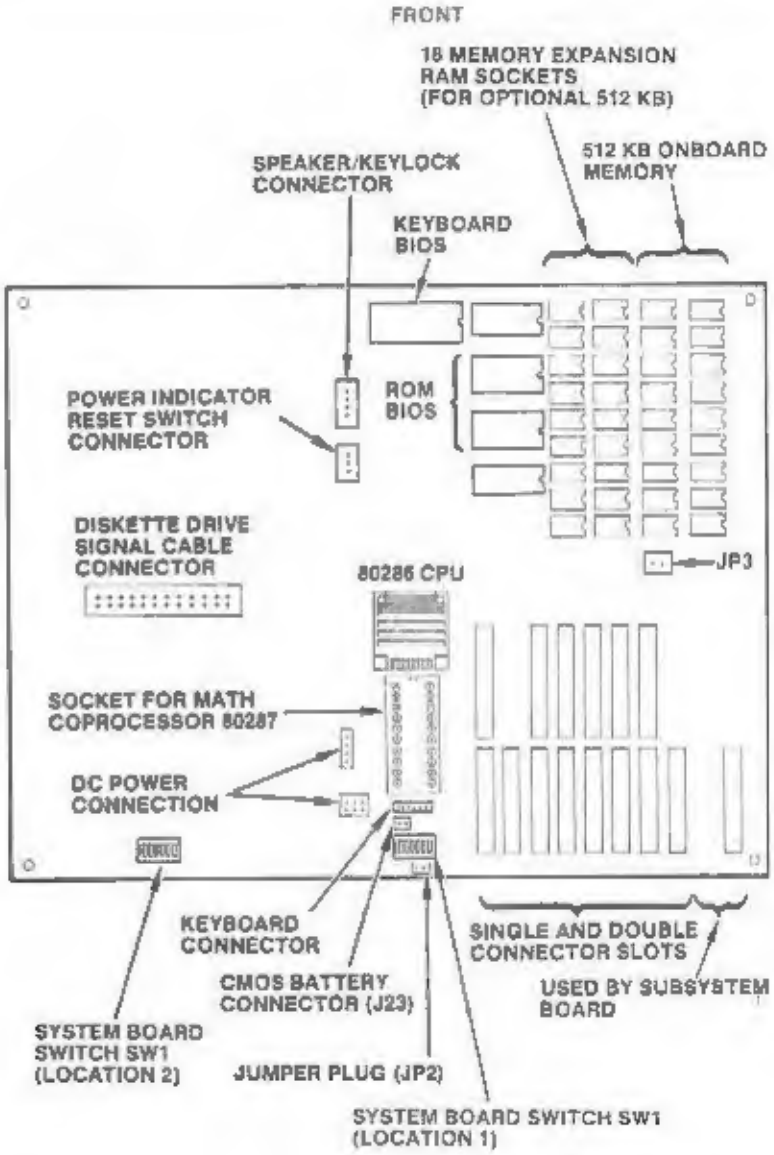


Figure 2–3. System Board

2.3. Microswitches and Jumper Plugs

Switch SW1 on the system board, and the switches on the memory expansion board, contain switchblocks with eight microswitches each. The microswitches are numbered 1 through 8. The notation SW1–8 refers to microswitch 8 on switch SW1. The arrow next to microswitch 1 points to the ON position. As shown in Figure 2–4, a ballpoint pen can be used to slide a microswitch to turn it ON or OFF. A switch setting in this guide is represented by a dot.

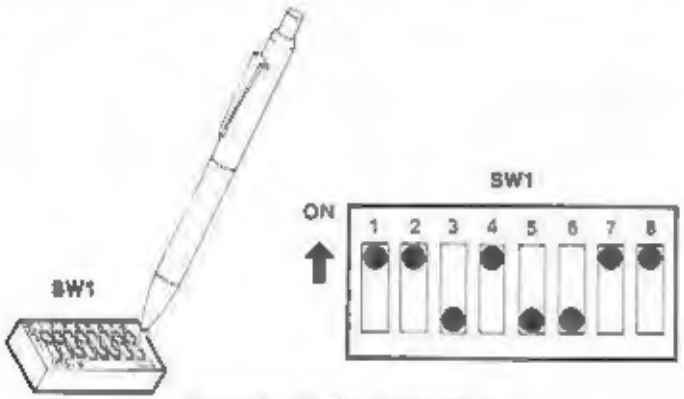


Figure 2–4. Setting Microswitches

Section 3.4, section 7.2, and Chapter 8 provide detailed information on setting switch SW1. Sections 9.1 and 9.3 describe how to set the expansion memory address switches.

Jumper plugs are small shorting blocks used in the same manner as a microswitch, to connect alternate circuit settings. Jumper plug settings are described in the following sections: section 3.4 for the subsystem board, section 7.2 for the system board memory, section 10.1 for the multiterminal adapter board, section 11.3 for the diskette drives, and section 11.4 for the fixed-disk drives.

Appendix B is a summary of microswitch and jumper plug settings.

2.4. Board Information

The different printed circuit boards that are used inside the system unit (e.g., controller and memory boards) are usually identified by a name or type designation printed along the top edge of the board on the component side (as illustrated in Figure 2–5). One end of the board has a metal bracket which fastens the board to the system unit connector panel.

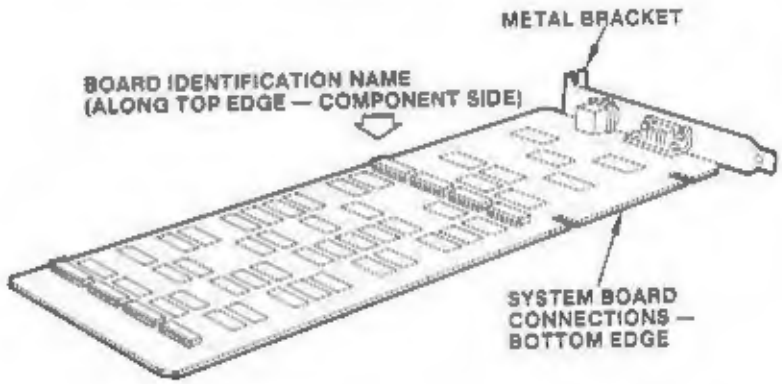


Figure 2–5. Board Identification

When you insert or remove a board, hold it only by the edges. Do not touch any of the component parts or wires, since any foreign substance on your fingers might introduce electrical shorts on the board. Figure 2-6 illustrates the recommended method of holding a board.

Figure 2-6 also illustrates the connector panel where the board is attached, the guide for the other end of the board, the system board connectors into which the boards are inserted, and the metal slot covers on the connector panel. The metal slot cover is removed when you install a board.

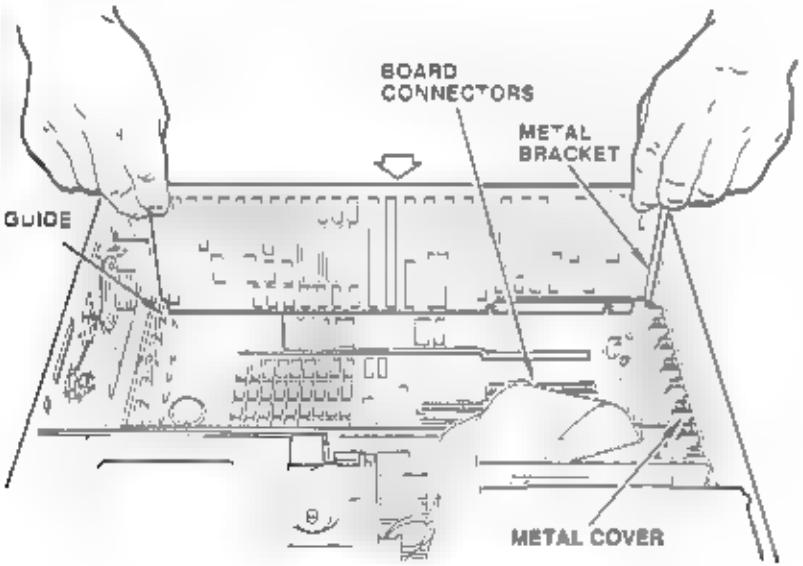


Figure 2-6 Board Handling and Insertion

Determining Board Location

Some boards must be installed in single or double-connector locations (Figure 2-3); the rest can be used in any location. Examine the bottom edge of the board to see where it will fit.

Another factor to consider when locating a board is cabling to that board. For example, the disk drive controller board requires cable connections between it and the drives. Ease of access to other boards, without having to remove cables on the disk drive controller board, dictates that the disk drive board be as close to the drives as possible.

Board Installation

To install a board, perform the following steps.

1. Using a Phillips screwdriver, unscrew and remove the metal slot cover for the desired location on the system unit connector panel as illustrated in Figure 2–7.

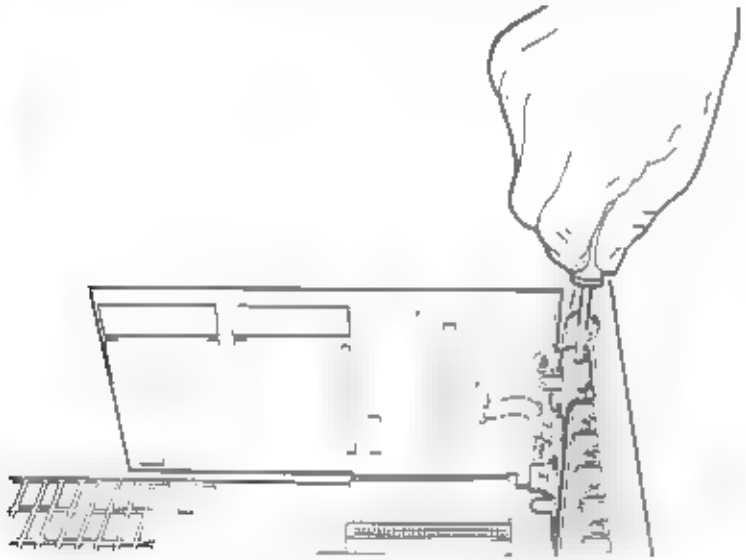


Figure 2–7 Removing the Metal Slot Cover

2. Align the board between the guide on the front of the system unit and the slot on the connector panel on the rear (see Figure 2–6).

3. Gently, but firmly, push the board straight down. Make sure the board is fully seated in the system board connector and the bottom end of the metal bracket is inserted in the slot in the bottom of the system unit chassis. The board is fully seated when the top of the metal bracket rests on the top of the connector panel. If the board does not go in all the way, try it in another location.

4. Using the screw which you removed in step 1, tighten the board in place.

Board Removal

A board may have to be removed (e.g., the fixed-disk controller) to provide access to system board components (e.g., SW1, JP2, math coprocessor socket, etc.).

1. Using a Phillips screwdriver, unscrew and remove the screw holding the metal bracket of the board to be removed.

2. Using a slight end-to-end rocking motion, pull up on the board until it comes loose from the system board connector.

3. Unplug any cables connected to the board.

4. Lift the board free of the guide (Figure 2–6) and remove it from the system unit.

Chapter 3. Installation Procedures

This chapter discusses what you need to do to get your PC working: how to connect the individual components, and what to do to prepare for installing options. Follow the steps given in this chapter as closely as possible to speed your work, help you avoid time-consuming mistakes, and prevent damage to your PC.

3.1. Initial System Setup

1. Prepare a suitable work area. Assemble your tools and any options you are installing.

   Place the system unit on a flat, stable work surface with plenty of room. It's easier to assemble and test your PC in a large area with access to a power outlet and then move it to its permanent location.

2. Insert one key in the system unit lock. Make sure the key is in the unlocked position (Figure 3-1).

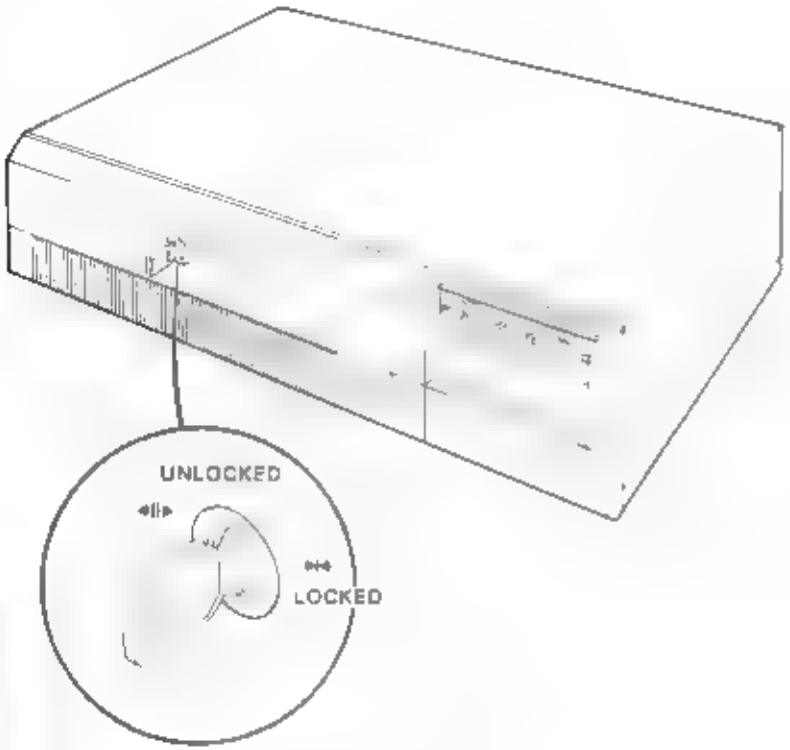


Figure 3-1 System Unit Lock

3 Remove the shipping card from the diskette drive. Keep the shipping card in a safe place. The card protects the drive when you move the system unit.

4. Turn to the system unit rear panel and set the system unit for the correct input voltage (Figure 3–2). Using a flat-blade screwdriver, push the input voltage select on switch to the right (the 115 VAC position) for 110 through 120 VAC input voltage. Push the selection switch to the left (the 230 VAC position) for 220 through 240 VAC input voltage. (Be sure to remove the reminder sticker that is beside this switch.)

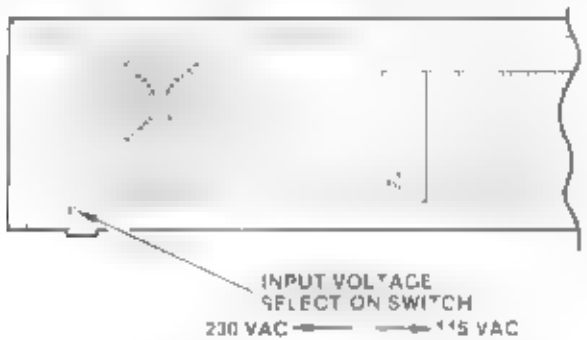


Figure 3–2 Setting the System Unit Voltage Switch

CAUTION

Ensure that the input voltage selection switch is set for the correct voltage. If the switch is set to 115 VAC when the system is connected to a 230 VAC electrical outlet, the system unit's internal power supply may be damaged when you turn on the system. For safety, the manufacturer sets the input voltage selection switch to 230 VAC.

3.2. Removing the System Unit Cover

1. Make sure the system unit lock is in the unlocked position (Figure 3–1)

2. Using a Phillips screwdriver, remove the six cover fastening screws: four screws and a lock washer from the rear panel of the system unit, as shown in Figure 3–3, and one screw on each side near the bottom front corner of the cover

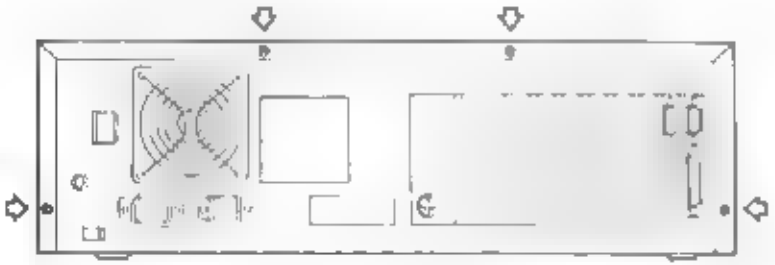


Figure 3–3 Removing the Fastening Screws

3. Holding the system unit cover by the sides, gently slide the cover back and then lift the cover up and away from the front of the system unit (Figure 3–4)

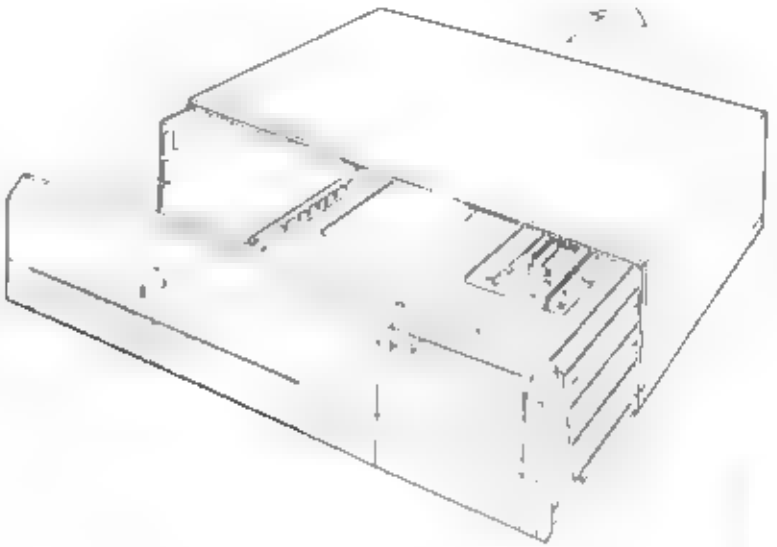


Figure 3–4 Removing the System Unit Cover

3.3. Completing Internal Unpacking

Several procedures are required to complete the unpacking of the system unit, as explained in the following paragraphs.

Removing the Shipping Brace

A shipping brace has been installed to provide extra protection during shipping. It must be removed for day-to-day operation of your PC.

1. Remove the two screws on the brace and remove the brace (Figure 3-5).
2. Replace the two screws in their chassis holes.
3. Store the brace in the system unit carton and reinstall it when you repack your PC for a move.

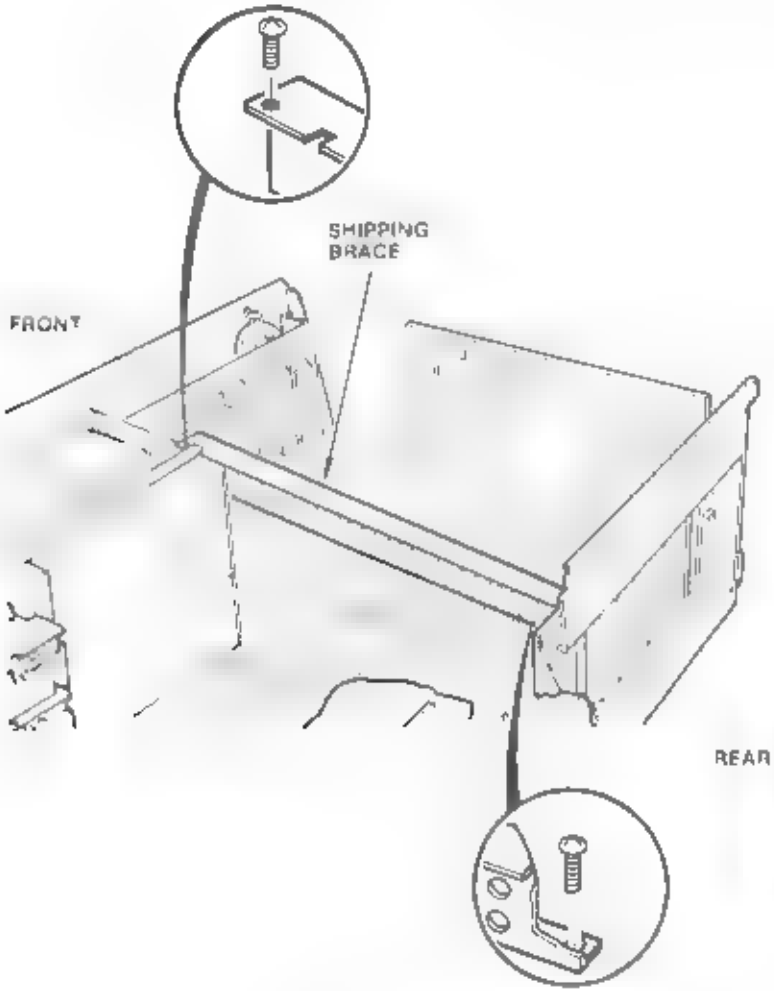


Figure 3-5. Removing the Internal Shipping Brace

Connecting the Battery

Locate the battery connector J23 on the system board (Figure 3–6)

The battery cable may or may not be connected to J23. If the battery cable is not connected, connect it as shown in Figure 3–6.

If you can't reach the battery cable connector because of the fixed-disk drive controller board, you must first remove the controller board according to the instructions in section 2.4.

After the battery cable is connected, and if you do not have an optional math coprocessor to install, replace the controller board as described in section 2.4. If you have an optional math coprocessor to install, do not replace the controller board at this time.

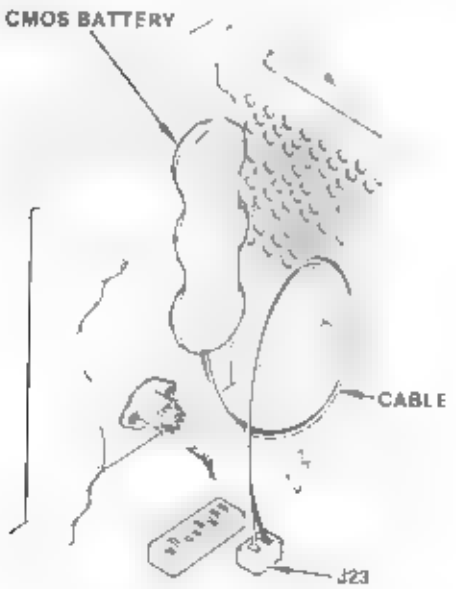


Figure 3–6. Connecting the Battery Lead Cable

3.4. Setting System Board Switches

Switch SW1 has eight small switches (microswitches) which control various aspects of your PC's operation. Figure 3–8 shows the different settings for SW1. When referring to switches, SW1-3 refers to microswitch 3 on switch SW1, for example. Appendix B is a summary of all switch settings.

There are two possible locations for SW1. Figure 2–3 (in section 2.2) shows location 1 (which requires the system unit cover be removed to access the switch) and location 2 (which can be accessed through the small panel next to the keyboard connector on the rear panel). SW1 in location 1 works in conjunction with jumper plug JP2. SW1 in location 2 does not use JP2, instead it uses switch position SW1-5. Refer to Figure 3–7.

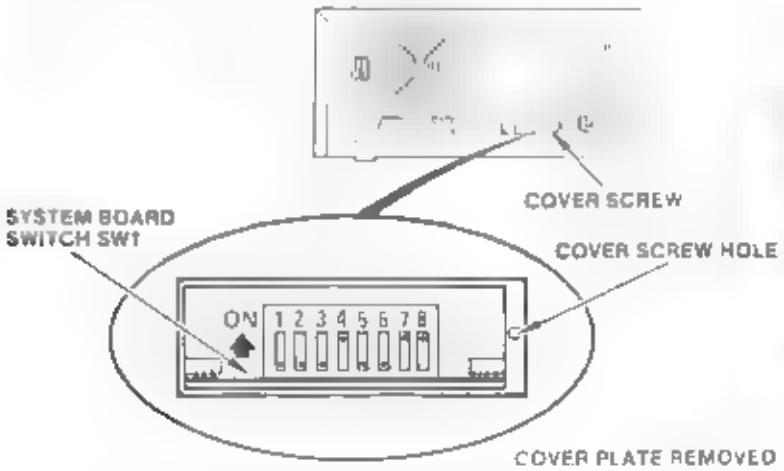


Figure 3–7. System Board SW1 Switch in Location 2

The procedures for accessing SW1 in location 2 are as follows:

1. As shown in Figure 3–7, remove the screw holding the right end of the rear panel plate.

2. Using your fingernail or a small flat-blade screwdriver with a prying motion, bring the right end of the plate out toward you and remove the plate.

3. With a ballpoint pen, reach in through the opening to set the SW1 switches. SW1–1 is on the left and SW1–8 is on the right. Up is ON and down is OFF.

4. To replace the panel, insert the left end tab between the chassis and the rear panel and slide into place. Attach the panel using the screw you removed in step 1.

Setting the CPU Operating Mode

SW1–1 and SW1–2 (Figure 3–8) are used to set the CPU (central processing unit) operating mode. For the most efficient operation, specify 7.16 MHz. For compatible IBM* Personal Computer AT operation, specify 6 MHz.

SW1–1	SW1–2	CPU Operation
OFF	OFF	6 MHz, 1 wait state
ON	OFF	Reserved for future use
OFF	ON	7.16 MHz, 0 wait states
ON	ON	8 MHz, 1 wait state

If an application program won't run, you may have to change the CPU setting.

*IBM is a trademark of International Business Machines, Inc.

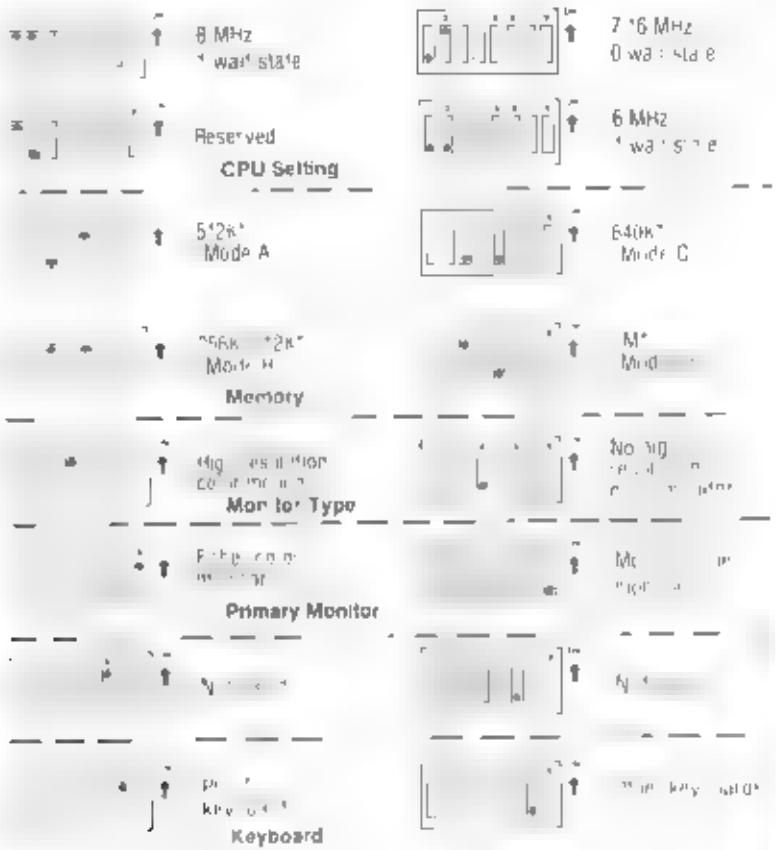


Figure 3–8. System Board SW1 Switch Settings

*Refer to section 7.2 for additional information on memory switch settings. (SW1–5 On/Off = JP2 On/Off.)

Setting User Memory

SW1–3 (along with JP2 or SW1–5) configures the user memory for your system. How you set SW1–3 depends on how much memory or memory chips, is installed on the system board and how it will be used.

If the system board only has 512K bytes of memory, set SW1–3 to the OFF position and install JP2 (set SW1–5 to ON).

If you have memory chips to install (for a total of 1M of onboard memory), follow the instructions in Chapter 7 for installing them and setting SW1.

Setting Monitor Switches

One or two monitors can be connected to your system unit. If two monitors are connected, one is monochrome and the other is color (either medium-resolution or high-resolution).

SW1–4 indicates whether the system has a high-resolution monitor. Set SW1–4 to ON if a high-resolution monitor is connected. Set SW1–4 to OFF if no high-resolution monitor is connected.

If the system has only one monitor, SW1–8 specifies the type of monitor. If the system has two monitors, SW1–8 determines which monitor is the primary monitor (the one that is active or configured when the system is loaded). Set SW1–8 to ON if a color monitor is the only or primary monitor. Set SW1–8 to OFF if a monochrome monitor is the only or primary monitor.

Setting the Keyboard Type

If your keyboard is the one shown in Figure 1–6, set switch SW1–7 to ON. Otherwise, set switch SW1–7 to OFF.

SW1–6 is not used. Set it to OFF.

Subsystem Board Jumper Plugs

The subsystem board provides one parallel printer interface and two asynchronous (CCU) channel interfaces. These three interfaces are enabled or disabled by jumper plugs on the subsystem board. (For example, when the printer interface is disabled, other printer boards can be installed in the PC using the same address and interrupts.)

Figure 3–9 shows the location of the jumper plugs on the board, and identifies the enabled/disabled position for each interface.

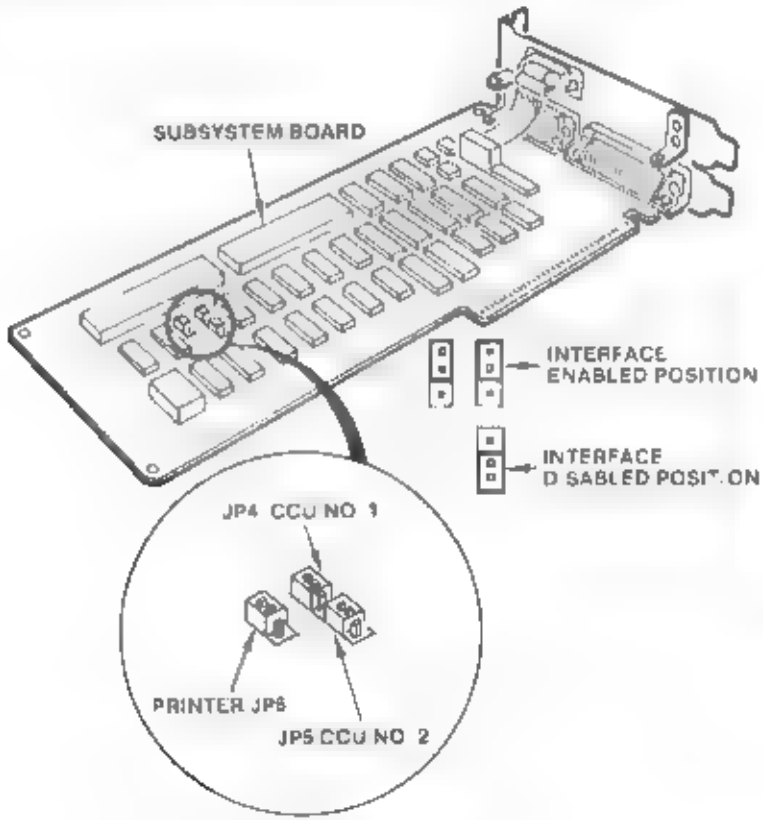


Figure 3–9. Subsystem Board Jumper Plugs

3.5. Installing Components

Each insta lable option for your PC has its own chapter containing al. of the information necessary to install it. The following list d rects you to the appropriate chapters. If you are installing more than one component install them in the order listed When the last component has been nstalled continue with section 3.6.

Component to Install	Covered In
80287 Math Coprocessor	Chapter 6
Memory Ch ps	Chapter 7
Monitor Controller Board (Required)	Chapter 8
Memory Expansion Boards	Chapter 9
Mu lterminal Adapter Board	Chapter 10
D skette Dr ves, Fixed-D sk Drives, and Controller	Chapter 11

Installation of other components s described n the documentation for the component

When you nstal a new system or modify the system by add ng a component, you must run the SETUP program to configure the system You use SETUP by fo low ng the instructions (called menus) that are d splayed on the screen See Chapter 4 for a tutorial on using SETUP

3.6. Replacing the System Unit Cover

1. Make sure that any internal cables are out of the way so they do not catch on the cover when you slide it into place.

2. Make sure that the key on the front panel is turned to the unlocked position

3. Holding both sides of the cover, lower it onto the chassis and slide it gently forward. Make sure the l p on the front edge of the cover is inside the front panel and the guide hooks on the rear corners of the cover fit into the slots in the chassis, as shown in Figure 3–10

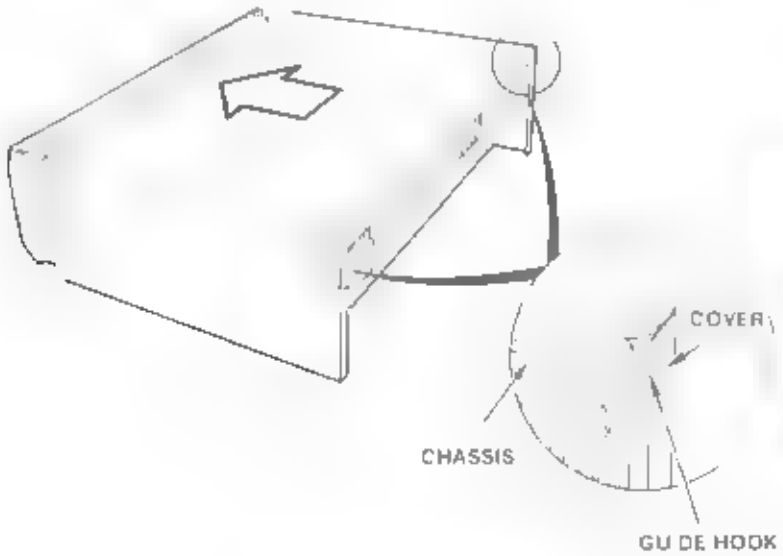


Figure 3–10 Replac ng the System Unit Cover

4. Replace the six cover fastening screws, four in the rear pane of the system unit (Figure 3–3) and one on each side. Use the lock washer with one of the top screws on the rear panel

3.7. Installing the Optional Floor Stand

The system unit can be used as shown in Figure 1–1, with the display monitor placed on the system unit. To save desk space, the system unit can also be placed on end (vertically) and mounted in an optional floor stand as shown in Figure 3–11. The floor stand makes the system unit more stable.

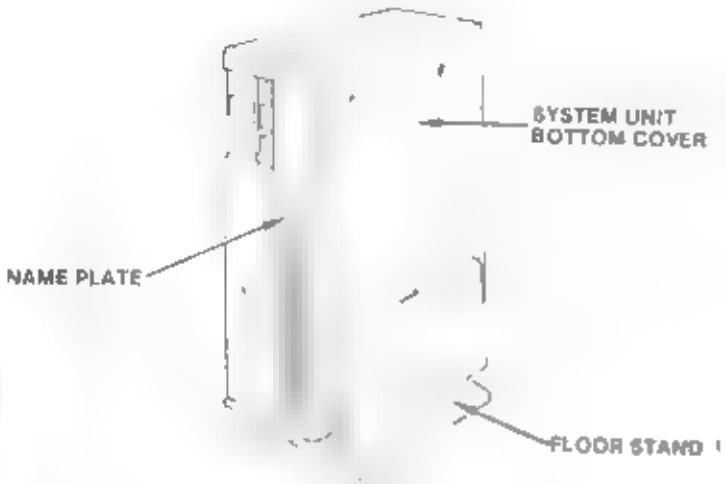


Figure 3–11 System Unit Mounted in Floor Stand

Assemble Floor Stand

1. Fit the two halves of the floor stand together, as shown in Figure 3–12.

2. Place the floor stand on its side with the base toward you. Insert one of the two long screws that came with the stand into the screw hole on the left, as shown in Figure 3–12, and tighten.

3. Turn the floor stand over and insert the other long screw into the screw hole on the left, and tighten.

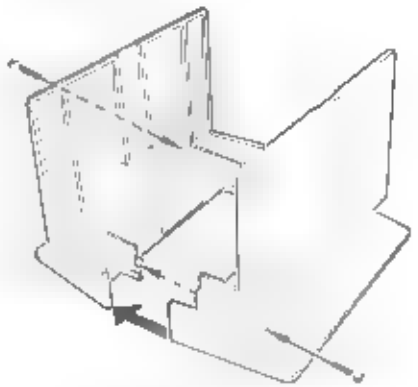


Figure 3–12 Assemble Floor Stand Halves

Install System Unit Bottom Cover

> NOTE
>
> If your system unit has been connected, before performing these steps, do the following:
>
> - Prepare the fixed-disk drive for moving (see section 11.5).
> - Turn off the system unit, and disconnect all cables.

4. Pad the surface of your work area so the system unit cover is not scratched. Carefully place the system unit upside-down on its top.

5. Place the bottom cover on the bottom of the system unit. It will fit on only one way. Notice that there are screw holes in the rear two feet of the system unit bottom, and screw holes just behind the two front cork feet.

6. Attach the cover to the system unit bottom using the four short screws that came with the bottom cover.

Place System Unit Into Floor Stand

7. Carefully slide the system unit into place in the floor stand (two people may be needed to lift the system unit). The raised tab on the system unit bottom cover fits into the keyed slot in the floor stand, as shown in Figure 3–13. The diskette drive should be toward the top of the system unit as it sits in the stand.

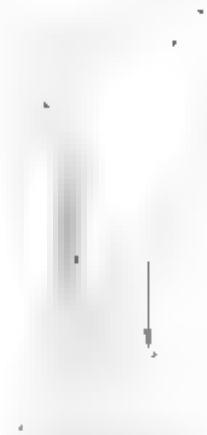


Figure 3–13. Keying System Unit to Floor Stand

8. Next to the indicator lights on the system unit is the PC name plate (see Figure 3–11). Push in on the bottom edge of the name plate and slide it down slightly. The top edge of the name plate should pop out. Remove the name plate and turn it 90 degrees clockwise (so the name is right side up). Place the bottom edge of the name plate into the slot at the bottom of the name plate opening. Push in and up. The name plate should slide and lock into place.

3.8. Connecting the Keyboard and Display Monitor

> NOTE:
>
> Before connecting or disconnecting the keyboard or monitor, always make sure the system unit is turned to OFF.

Connecting the Keyboard

1. Place the keyboard in front of the monitor.
2. Connect the keyboard to the system unit by plugging the coiled cord from the keyboard into the rear of the system unit as shown in Figure 3–14.

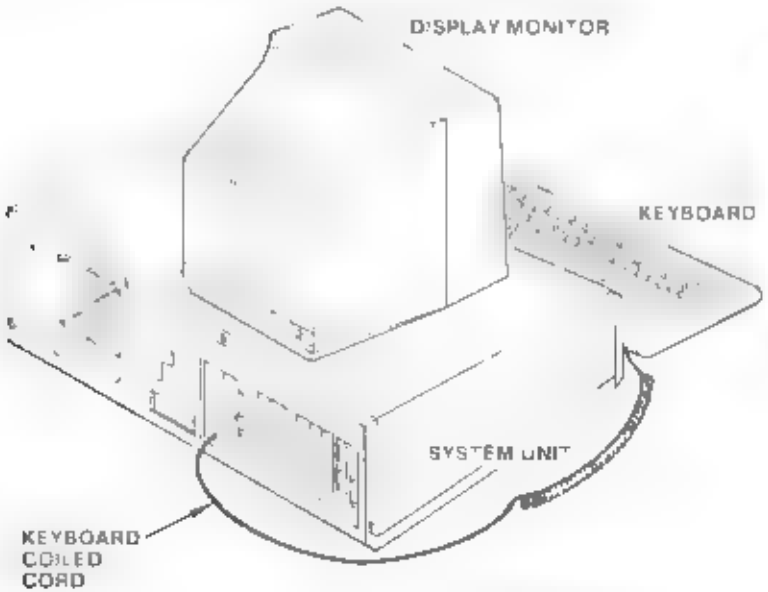


Figure 3–14. Connecting the Keyboard to the System Unit

3. If the coiled cord for the keyboard is too short for the desired placement of the keyboard, a keyboard extension cable (Figure 3–15) may be used between the coiled cord and the system unit. Connect the socket end of the extension cable to the keyboard cord and the other end to the system unit.

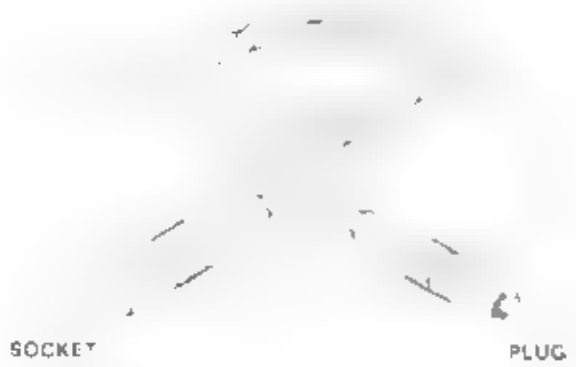


Figure 3–15. Keyboard Extension Cable

Connecting the Monitor

> **NOTE**
>
> The monitor must operate at the same voltage as the system unit setting (115V/1.0A or 230 V/0.5A).

1. Place the display monitor on or near the system unit.

2. Connect the power cable from the display monitor to the rear of the system unit, as shown in Figure 3–16. If the monitor does not have a power on/off switch or if the switch is left in the on position, the monitor automatically turns on and off when you turn the system unit on and off.

   If the monitor power cable has a three-prong plug, connect it to a standard AC outlet. The monitor must now be turned on and off separately from the system unit.

3. Plug the signal cable from the display monitor (the one with the 9-pin, D-shaped plug) into the connector on the system unit, as shown in Figure 3–16. The exact location of the connector depends on where the monitor controller board is installed.

4. Using a small screwdriver, tighten the two screws on the ends of the plug to hold the plug firmly in place.

5. Repeat steps 1 through 4 if your system has two monitors (see section 1.5).

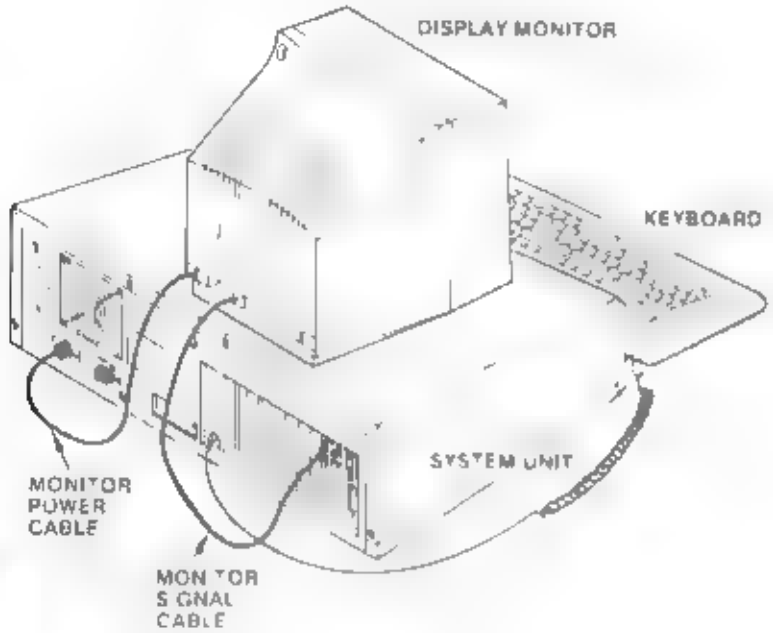


Figure 3–16 Connecting the Display Monitor to the System Unit

3.9. Connecting AC Power

Make sure the system unit power switch is OFF. Connect the system unit to an electrical outlet (Figure 3–17). Plug one end of the power cable into the receptacle on the left rear side of the system unit. Plug the other end of the cable into a properly grounded electrical outlet.

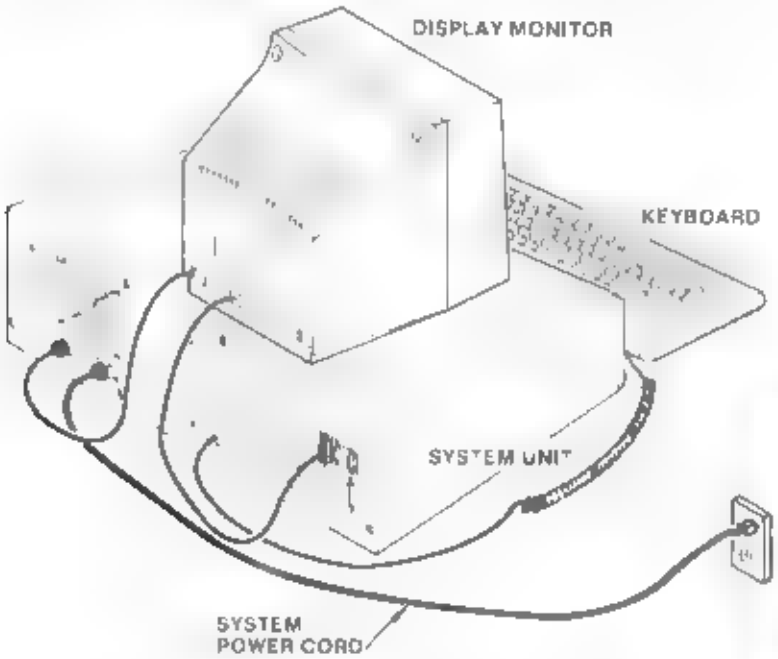


Figure 3–17 Connecting the System Unit to an Electrical Outlet

NOTE

Shielded cables with an 85% minimum braid shield must be used for the power cord, RS-232-C interconnection cables and peripheral cables.

3.10. Starting the System

1. Turn the system unit around and arrange the monitor and keyboard in a comfortable working position.

2. Ensure that the key in the front panel lock is turned to the unlocked position. Now you are ready to turn the PC on, to configure the system, and make sure that it runs properly.

3. Turn the power switch at the rear of the system unit to the ON position. The power light on the front panel of the system unit lights. If the monitor power cable is not plugged into the system unit back panel, turn on the monitor power.

   After a few moments you will hear a beep. The beep indicates that the system has performed a self-test, and all is in order.

   If you hear several beeps, push the system reset button or turn the power off and then on. If the beeps occur again, you have probably made one or more mistakes when setting SW1. Check the settings carefully (see section 3.4). If the beeping persists and you can't figure out what the problem is, consult Chapter 5.

4. Insert the diagnostics diskette into the upper diskette drive (drive A) in the system unit, as shown in Figure 3-18. Detailed instructions are found in section 1.6.

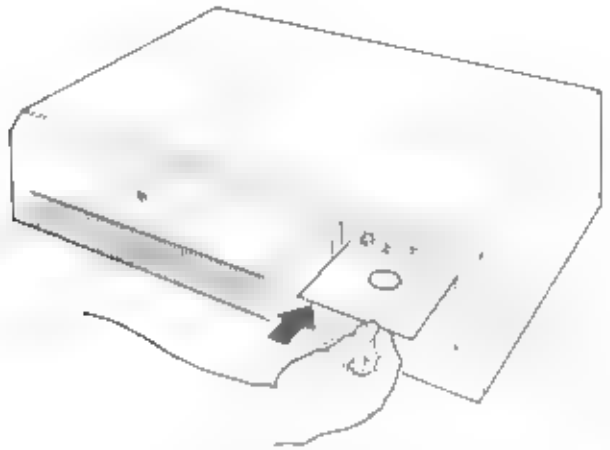


Figure 3-18. Inserting the Diagnostics Diskette

5. Turn the lever on the front of the diskette drive clockwise to lock the diskette in the drive. The lever should move smoothly into position. If it does not, remove the diskette and try again. Do not force the lever.

   If the following message appears on the screen before the diagnostics diskette is locked in drive A, finish inserting the diskette and then press the system reset button:

   ? HDD NOT READY

   The system will again perform the self-tests mentioned in step 3.

6. Every time you load your PC, it performs hardware self-testing, and the system configuration stored in the CMOS memory is examined.

   The first time you load the system from the diagnostics diskette, the hardware self-test will display one of the following two messages

7. Press the F1 key. (If your keyboard does not work, recheck switch SW1–7, section 3.4.) After a few seconds, the screen will display the following

   Followed by

8. Press the N (no) key. The screen displays

   Do you wish to set up

9. Press the Y (yes) key. The system loads and runs the SETUP program. Continue with the SETUP program in section 4.2

Chapter 4. System Configuration

Your PC needs to know its configuration — that is, how much memory is installed on the system board, how much expanded memory (memory expansion boards) is installed, and what peripherals are connected.

Your system configuration is retained in a special kind of memory called CMOS. CMOS is battery-backed random access memory (RAM) that is not erased when the system is turned off

4.1. Starting SETUP

When you load either MS-DOS or the diagnostics, the system checks to determine if configuration has been performed. If the system has not been configured, one of the two following messages is displayed, indicating you must run the SETUP program

[illegible] Continue "F1" KEY

[illegible]

CMOS CHECK SUM FAIL -- Continue "F1" KEY

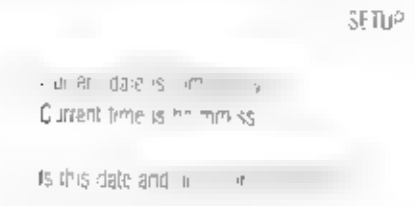
1. If power is off, turn power on
2. Insert the diagnostics diskette into drive A.

> NOTE
>
> You always run the SETUP program using the diagnostics diskette, regardless of whether you use the MS-DOS or XENIX operating system

3. If you just turned the power on, go to step 4. Otherwise, push the system reset button to reload the system. Or, type the word A.SETUP (in either uppercase or lowercase letters) and press **Return** or **Enter**. If you make a mistake, press the **Back Space** key to erase the mistake.
4. Follow the menu instructions on the screen

4.2. Setting Date And Time

1. The SETUP program asks you to verify the current date and time. (If MS-DOS has been loaded and the time and date were set, they should be correct here.)



If both the date and time are correct, type **Y** (yes) and press **Return** or **Enter**. Go to section 4.3.

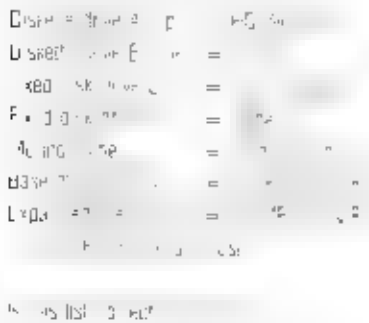
If the date and/or time are not correct, type **N** (no) and press **Return** or **Enter**.

2. The current date is displayed. If the date is correct, press **Return** or **Enter**. If the date is incorrect, type the correct date in the format indicated and press **Return** or **Enter**. If you make a mistake, press the **Back Space** key and retype the date.

3. If the time is correct, press **Return** or **Enter**. If the time is incorrect, type the correct time in the format indicated (the seconds are optional, but the second colon is not) and press **Return** or **Enter**.

4.3. Setting System Configuration

1. The SETUP program displays the current configuration, such as the following example:



In the above example, the line "( ): Results of Self Test" indicates that the values shown in parentheses (e.g., 96 tpi, 512 KB, etc.) are the results of the system unit self-test. Your setup (e.g., HD, 512 KB) should match the self-test values.

In the list on y the primary monitor (if two are connected) s shown The sett ngs n SETUP must match SW1 switch sett ngs (section 3.4)

If the list is correct, type Y (yes) and press **Return** or **Enter**. The SETUP program ends and the MS-DOS prompt (A> or C>) is displayed. Continue with step 10.

If the list is not correct or you want to change the configuration, type N (no) and press **Return** or **Enter**. SETUP prompts you for configuration information one item at a time. The prompt also displays the current configuration value. If an item is correct, just press **Return** or **Enter** for that item and move to the next item.

2. Identify diskette drive A according to type (see section 1[illegible]). Enter 1 to configure a 48 tpi (360K-byte) diskette drive (2D) or enter 2 to configure a 96 tpi (1.2M-byte) diskette drive (HD). Then press **Return** or **Enter**.

3. Identify diskette drive B according to type. Enter 0 if you do not have a second diskette drive, and press **Return** or **Enter**. Otherwise, enter 1 or 2 to identify the drive type.

4 If you have a fixed-disk drive, you must identify the fixed-disk drive type. When you remove the system unit cover, the type number is on the rear of the disk drive (see section 11.1).

Enter 0 and press **Return** or **Enter** if you do not have a fixed disk drive. Otherwise, enter the type number for drive C and press **Return** or **Enter**.

Fixed Disk Drive Type

Fixed Disk Drive Type =

Type C = >

5. Identify the type for fixed-disk drive D. Enter 0 if you do not have a second fixed-disk drive, and press **Return** or **Enter**. Otherwise, enter the type number and press **Return** or **Enter**.

Fixed Disk Drive Type

Fixed Disk Drive Type = 0-15

Drive D = 0 -->

6. If the primary monitor is a color monitor, enter 1 or 2 to set the default display mode, either 40 or 80 characters per line. Enter 3 if the primary monitor is monochrome. Press **Return** or **Enter**.

Mon

= >

= >

The second monitor, if connected, is not shown in the configuration program.

7 Indicate the amount of usable memory installed on the system board. The choice must match the setting for switch SW1–3 as shown in Table 4–1. Refer to section 7.2 for more information. Type **0** or **1**, and press **Return** or **Enter**.

Base memory capacity

= 0

640 KB
Add-on chips addressed from
512 KB) = 1

Base memory capacity (0/1) 0 >

If the system board is set for 512K bytes or 1M byte of user memory (section 7.2), enter **0**.

If the system board is set for 640K bytes of user memory (or for 256K/512K bytes), enter **1**.

Table 4-1. Configuring Memory Usage

On-Board Memory Use	Switch Settings SW1-3	Switch Settings JP2/SW1-8	Memory Mode	Base Memory Capacity	Number of Memory Expansion Boards***	Total Expansion Memory Capacity**
512K	OFF	ON	A	0	0	0
					1	2
					2	4
640K	OFF	OFF	C	1	0	0
					1	2
					2	4
1M	ON	OFF	D	0	0	0.5
					1	2.5
					2	4.5
256K/512K	ON	ON	B	1	0	0.5
					1	2.5
					2	4.5

* This column answers configuration set-up step 7

** This column answers configuration set-up step 8

*** When each board contains 2M bytes of memory. If you install boards that have a different amount of memory, use the instruction in step 8 to determine the total expansion memory capacity.

8. Indicate the total expansion memory and press Return or Enter. The choice must match the setting for switch SW1-3, shown in Table 4-1.

Total Expansion Memory Capacity

None		0
512 KB	(on system board)	0.5
1 MB	(total all boards)	1
1.5 MB	(total all boards)	1.5
2 MB	(total all boards)	2
2.5 MB	(total all boards)	2.5
3 MB	(total all boards)	3
3.5 MB	(total all boards)	3.5
4 MB	(total all boards)	4
4.5 MB	(total all boards)	4.5
5 MB	(total all boards)	5

Total Expansion Memory Capacity: 0 -->

If you have a different amount of memory than shown in Table 4-1, use the explanation below to determine your total memory capacity.

If the system board is set for 512K or 640K bytes, the remaining system board memory is 0. Enter 0 (if no memory expansion boards) or the total memory on the memory expansion boards and press Return or Enter.

If the system board is set for 1M or 256K/512K bytes (leaving 0.5M of add-on chips addressed from 1MB), enter 0.5 (if no memory expansion boards) or 0.5 plus the total memory on the memory expansion boards and press Return or Enter.

9. The configuration list shown in step 1 is redisplayed with the new selections. Verify the new configuration. If the list is correct and you don't need to change it, type Y (Yes) and press Return or Enter.

   If the list is not correct or you want to change the configuration, type N (No) and press Return or Enter. SETUP again prompts you for configuration information. When a correct list is displayed, and the test is correct, just press Return or Enter for each item and move to the next item. Go to step 7.

10. When you answer Y to the last prompt, SETUP resets the system and the self-tests are rerun. If an error message appears, refer to section 5.5 for the meaning. When the system configuration screen is again displayed, the configuration is complete.

    Replace the diagnostics diskette with the first operating system diskette and press the system reset button. If you have a system with a fixed disk drive, it is recommended that you initialize the fixed disk (section 5.4) before formatting and partitioning the disk.

You are now ready to use your PC. If you have just installed your PC, the first thing you should do is make backup copies of your system diskettes. Also, if you have a fixed-disk drive, you must install the operating system from the system diskettes to the fixed-disk drive, called installing the operating system on the fixed disk. Instructions for both procedures are in the operating system documentation.

NOTE

To verify the configuration of your PC, you can run the diagnostics program. First, you must make a non write-protected backup copy of the diagnostics diskette. Also, format a blank diskette of the appropriate type for each diskette drive. Refer to you operating system instructions for information on making copies of diskettes.

Refer to section 5.1 on how to use the diagnostics diskette.

8. Indicate the total expansion memory and press **Return** or **Enter**. The choice must match the setting for switch SW1-3, shown in Table 4-1.

If you have a different amount of memory than shown in Table 4-1, use the explanation below to determine your total memory capacity.

If the system board is set for 512K or 640K bytes, the remaining system board memory is 0. Enter 0 (if no memory expansion boards) or the total memory on the memory expansion boards and press **Return** or **Enter**.

If the system board is set for 1M or 256K/512K bytes (leaving 0.5M of add-on chips addressed from 1MB), enter 0.5 (if no memory expansion boards) or 0.5 plus the total memory on the memory expansion boards and press **Return** or **Enter**.

9. The configuration list shown in step 1 is redisplayed with the new selections. Verify the new configuration. If the list is correct and you don't need to change it, type **Y** (yes) and press **Return** or **Enter**

   If the list is not correct or you want to change the configuration, type **N** (no) and press **Return** or **Enter**. SETUP again prompts you for configuration information one item at a time. If an item is correct, just press **Return** or **Enter** for that item, and move to the next item. Go to step 2

10. When you answer **Y** to the list prompt, SETUP resets the system and the self-tests are rerun. If an error message appears refer to section 5.3 for the meaning. When the system components screen is again displayed, the configuration is complete.

11. Replace the diagnostics diskette with the first operating system diskette, and press the system reset button

You are now ready to use your PC. If you have just installed your PC, the first thing you should do is make backup copies of your system diskettes. Also, if you have a fixed-disk drive, you must transfer the operating system from the system diskettes to the fixed-disk drive (called installing the operating system on the fixed disk). Instructions for both procedures are in the operating system documentation.

NOTE

To verify the configuration of your PC, you can run the diagnostics program. First, you must make a non-write-protected backup copy of the diagnostics diskette. Also, format a blank diskette of the appropriate type for each diskette drive. Refer to your operating system instructions for information on making copies of diskettes.

Refer to section 5.1 on how to use the diagnostics diskette

Chapter 5. Problem Solving

This chapter is designed to help you solve problems you might run into while you are using your PC.

It is divided into the following sections:

- Diagnostics Diskette

  This section explains how to use the diagnostics diskette to check the configuration, prepare the fixed-disk drive for moving, and execute the diagnostics program.

- Startup

  This section analyzes possible problems with the system unit, the display monitor, the diskette drives, the fixed disk, and the keyboard.

- Error Messages

  This section lists some of the common error messages that may be displayed when you load the operating system.

5.1. Using the Diagnostics Diskette

Included with your PC is a diagnostics diskette. This diskette contains a program called DIAGX that tests each part of the PC and reports any errors it discovers. Before running DIAGX, make a backup copy of the diagnostics diskette and use the backup copy for testing. Also, format a blank diskette of the correct type (HD or 2D) for each diskette drive in your PC.

To use the diagnostics diskette:

1. Remove any diskettes from the drives.
2. Insert the diagnostics diskette into drive A and press the system reset button (through the system unit front panel).

   The system runs through a series of self-tests. If a problem occurs during the self-test, refer to the system unit startup test in section 5.2. If the tests are good, the diskette in drive A is read and the screen displays the following:

Checking the Configuration

3. After a few seconds, the screen will change to look like this.

4. Check the list carefully to make sure the descriptions match the hardware components you are using. If you respond to the question with **Y** (yes), the list is correct, the system continues with step 5.

   If the list is incorrect, either the hardware is wrong (installed incorrectly or wrong switch settings) or the SETUP configuration is wrong. When you enter **N** (no), the system displays the message:

   If you think the SETUP configuration is wrong, answer **Y** (yes). The system loads the SETUP program (refer to Chapter 4).

   If you think the hardware is wrong, respond **N** (no). The system displays the message:

   If you reached here by mistake, leave the diagnostics diskette in drive A and answer **Y** (yes), and return to step 2. If you want to run another program, change diskettes and answer **Y** (yes).

   To check the hardware, turn off the system unit and recheck the appropriate elements. Then turn the power on and go to step 2 to see if the problem has been resolved.

   If you respond **N** (no) to the question, the system displays the following message and everything stops:

   The keyboard becomes inoperative. The only way to recover is to press the system reset button or turn the system off and then on.

Preparing the Fixed-Disk Drive for Moving

5. If a fixed-disk drive is not configured for your PC, this step is skipped. Continue with step 6.

   If a fixed-disk drive is configured for your PC, the next message to appear is:

   Do you wish to prepare the system for moving? Y/N

   If you answer Y (yes), the DIAGX program will position the fixed-disk drive read/write heads to prevent damage while the system is being moved (see section 11.5 for a description of when to perform this procedure). You will then hear a continuous beep and be prompted to turn off the system unit.

   If you answer N (no), continue with step 6.

Executing the Diagnostics

6. The following message(s) appear on the screen:

   [illegible]

   Remove the diagnostics diskette, and insert a formatted diskette of the correct type (2D or HD) in each drive. These diskettes will be used when each drive is tested.

   If you enter Y (yes), the test cycle will stop when an error occurs. This will allow you to note the error message and take the appropriate action to resolve the problem. Otherwise, enter N (no).

7. Next, you will be asked:

   [illegible]

   If you do not want the test to be performed more than once, enter N (no), and the system will begin the test. If you want the test to repeat, enter Y (yes). Then you will be asked:

   How many times should test cycle?

   Specify the number of times you want it to cycle (up to 999) and press **Return** or **Enter**.

When the system begins the test, it displays the names of the test one at a time:

[illegible]

R-memory is the amount of real memory on the system. P-memory is the amount of protected memory. (This test is not performed if the system configuration has no P-memory.)

Some of these tests take a minute or more, so be patient while DIAGX checks your system. Even if the light on one or more of the drives is not on, internal checking may still be taking place. Wait for the next screen display before taking any action.

Typematic Test

8. When the memory testing is complete, the system displays a typematic test. If your PC is configured for the PC/IT keyboard (SW1–7 on), only one typematic test screen is available. If SW1–7 is off, two typematic test screens are available. If the keyboard on the screen does not match your keyboard, press **Ctrl Z** to change to the other keyboard display.

   Press any key to determine whether the key pressed is being registered correctly. When a key is pressed, the character should appear on the screen. Press as many keys as you want.

   To end the keyboard test, press **Ctrl Y**. The test continues by displaying a series of screens that test your display monitor.

Monochrome Monitor Test

If a monochrome monitor is attached, six screens are used to test for correct character attributes, underline, intensity, blinking, and reverse video. Refer to Figures 5-1 through 5-4. If an error is discovered, the system should report it. Refer to section 5.3 for further explanation of any error messages displayed by the system.

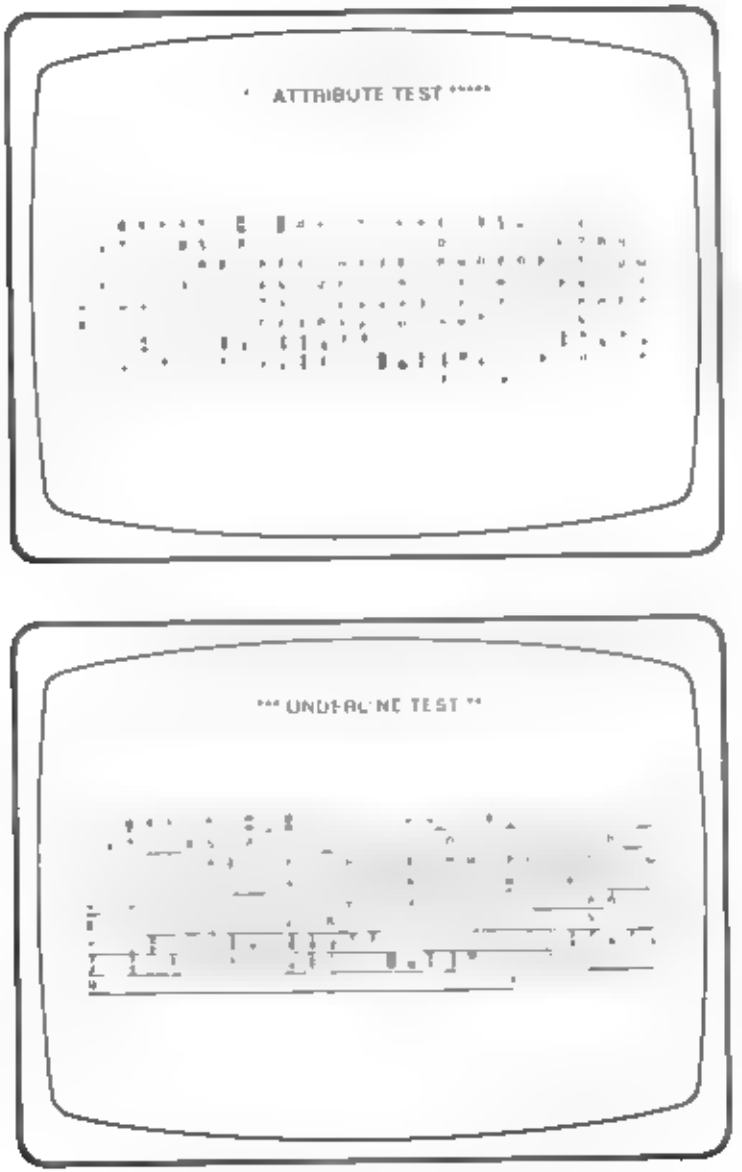
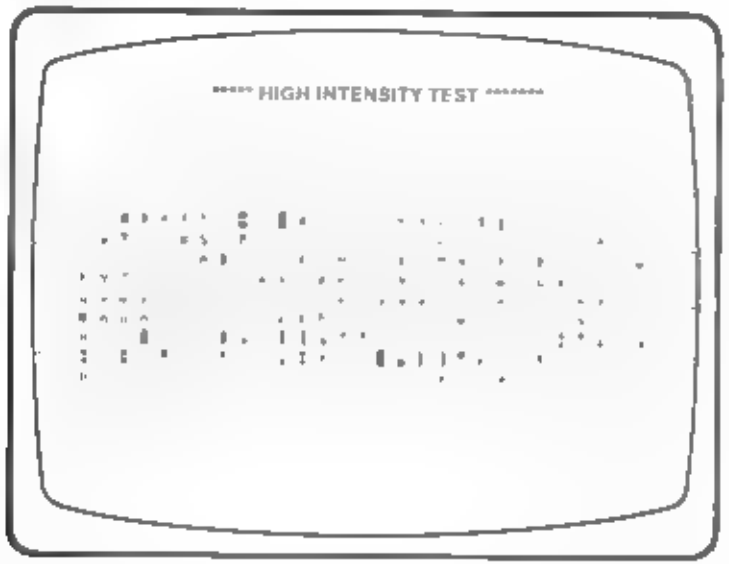


Figure 5-1 Attribute and Underline Tests



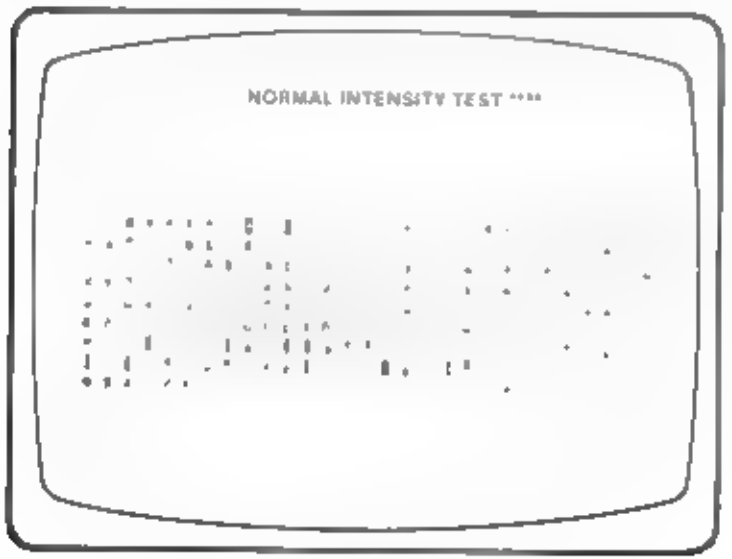
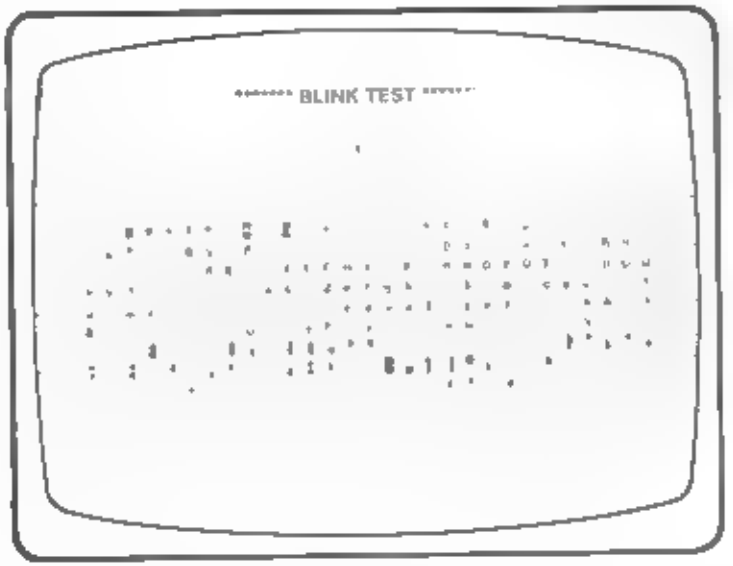


Figure 5-2 Intensity Tests



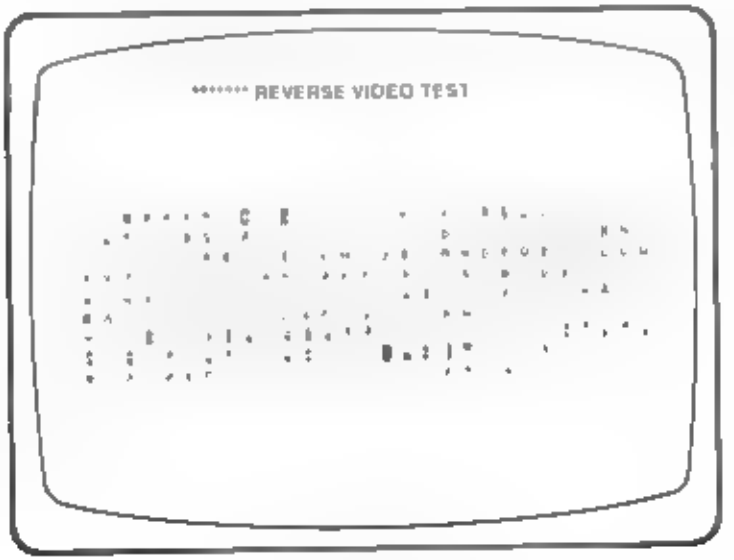


Figure 5-3 Blink and Reverse Video Tests

Color Monitor Tests

If a color monitor is attached, nine screens are used for 40 or 80 character mode, video addressing, and color display tests. Refer to Figures 5–4 through 5–6. If an error is discovered, the system should report it. Refer to section 5.3 for further explanation of any error messages displayed.

Figure 5–4. Character Mode Tests

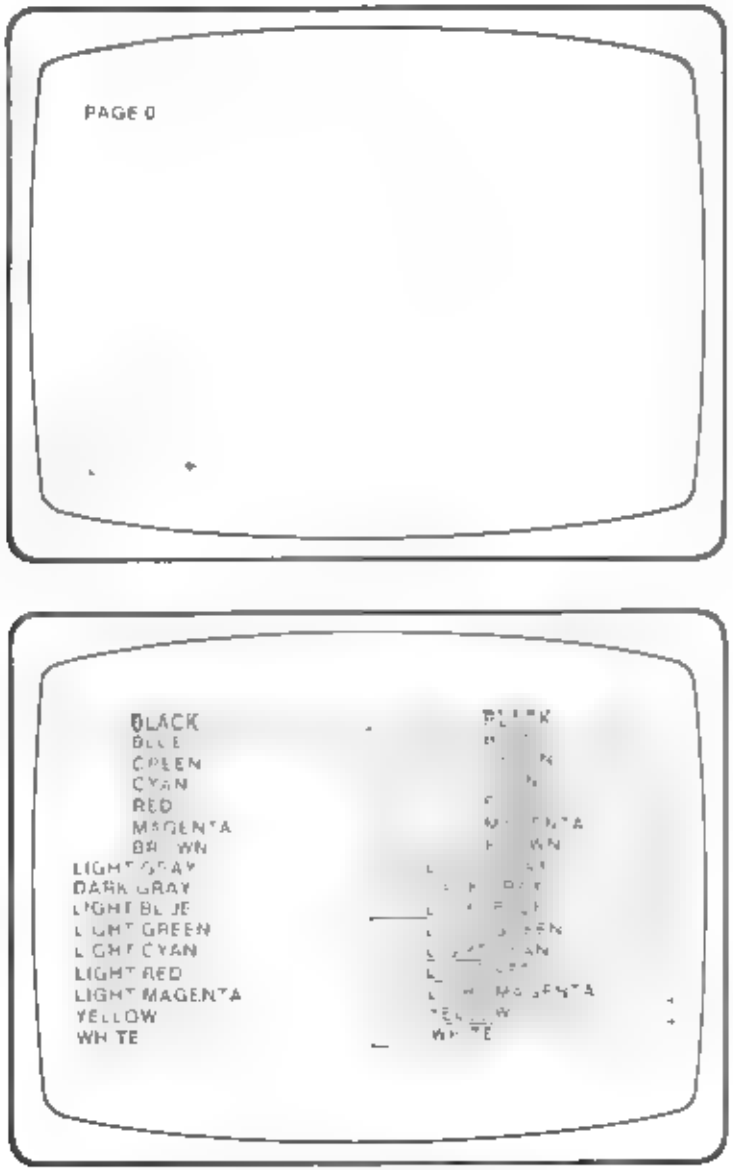


Figure 5-5 Video Attribute and Color Tests

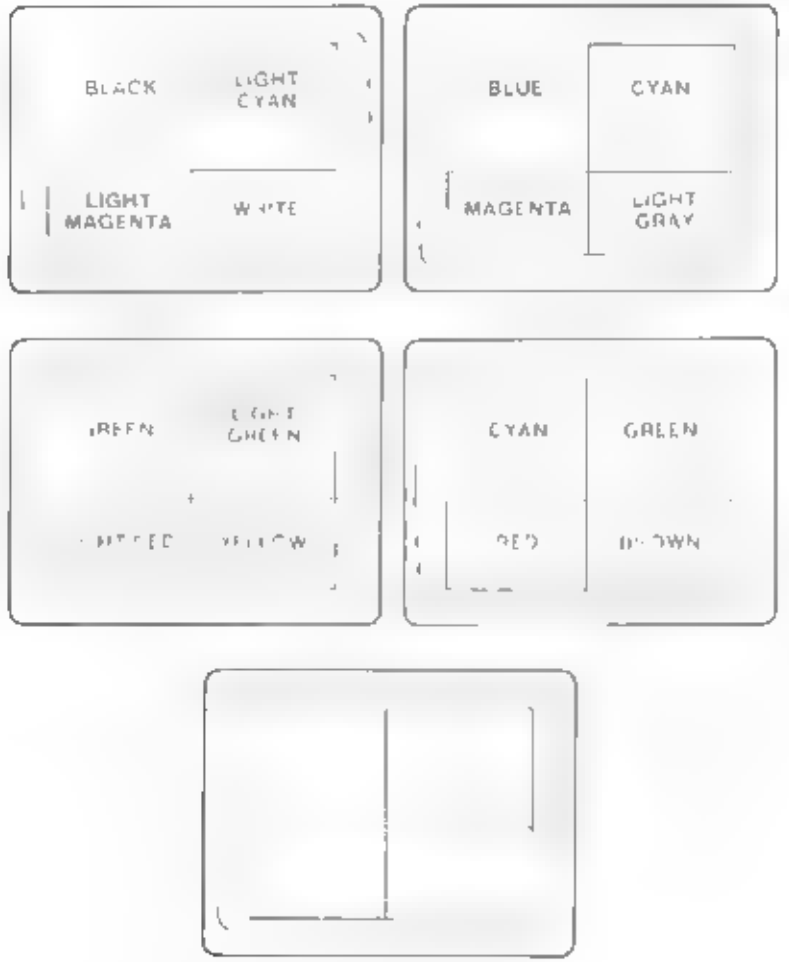


Figure 5-6 Quarter Screen Color Tests

Disk and Board Tests

Next, the system will display:

Diskette

The test of the diskette drive A functions takes several minutes. The in-use light on the diskette drive will come on while the test is running.

If an error occurs, make sure the diskette is fully inserted and the drive door is closed.

For diskette errors, the system reports the track, sector, and drive location for each error discovered. If the error prevents the system from reading the diskette, the test cannot be continued. The system asks you to restart the test by pressing the space bar. But, if the diskette error condition is still in effect, the test will again be suspended. It may be necessary to reset the system to exit the test.

When the diskette drive A test is completed, and if the system configuration indicates a second diskette drive, this test will repeat for diskette drive B. (If drive B does not have a formatted diskette of the correct type, 2D or HD, the system will stop or hang up. Insert a diskette into drive B and press the system reset button.) Otherwise, it will go to the next test.

Next, the system displays the following message:

PRINTER BOARD Diagnostic test start

After the printer board (which is part of the subsystem board) test is completed, the two asynchronous (CCU) ports on the subsystem board are tested and the system displays:

Dual

If the system configuration indicates one or two multiterminal adapter boards (or CCUs), the system displays either four or eight more CCU messages.

If the system configuration indicates a fixed disk drive, the system then displays:

FXD

If two fixed disk drives are configured, both drives are tested.

These fixed disk drive and controller function tests take several minutes. The in-use light on the system unit front panel comes on during the tests.

The system reports the date and time of any errors. This information is recorded on the diagnostics diskette along with some information about the occurrence of the error. For fixed disk errors, the system reports the cylinder, sector, head, and drive location, with an error code for each error discovered.

If all the tests are completed successfully, the system reports the number of test cycles completed (flashing line at the top of the screen).

Diagnostic TEST END

Do y

If you respond **N** (no), the system redisplays the system components screen. Return to step 3.

A **Y** (yes) response to the question displays the following message

If you respond **N** (no), the system displays the following message and everything stops

The keyboard becomes inoperative. The only way to recover is to press the system reset button or turn the system off and then on.

If you respond **Y** (yes), the system will reload (reboot) as though you pushed the system reset button. Before you answer the question, you may want to remove the diskette from drive A and insert the first operating system diskette. Then respond with **Y** (yes).

You are now ready to use your PC.

5.2. System Startup Problems

Before you turn on your PC, make sure everything is in order.

CHECKLIST

- Make sure the system unit is unplugged from the wall outlet while you are securing the cables.
- Make sure the system ON/OFF switch on the rear of the system unit is turned OFF.
- Make sure the voltage selection switch at the rear of the system unit is set to the correct voltage.
- Make sure the system unit is plugged into a working electrical outlet.
- Ensure that the key in the front panel is turned to the unlocked position.
- Load the operating system from diskette or fixed disk according to the instructions for that operating system.

System Unit Problems

The system unit is the core of your PC. The power supply, the processing unit, the memory storage areas, the fixed-disk drives, and the diskette drives are all contained in the system unit. The system unit may be thought of as the controller for peripherals such as the keyboard, display monitor, disk drives, and printers.

If you are having trouble with the system unit, it is very difficult to determine if other parts of your PC are working properly.

The system unit is not designed to be serviced by untrained users. However, some parts of the system unit may be removed and replaced.

Chapters 6 through 11 contain detailed descriptions of each of the replaceable modules within the system unit. Installed modules should usually be removed only upon the advice of a qualified service representative, and then, the service instructions must be followed very carefully.

Display Monitor Problems

When you load the operating system, the operating system normally displays a startup message after the system has completed the self-tests. The startup message indicates that the operating system is loaded and the system unit is responding.

If nothing appears on the screen, check to see that the monitor power-on indicator is lit. If not, check the monitor power source (system unit or ac outlet), refer to "System Unit Startup Test" in this chapter.

Did you hear a beep? If you hear a beep but nothing appears on the screen, make sure the display monitor has power. If the monitor is on and warmed up, adjust the brightness and contrast of the display monitor until one or more characters appear on the screen. Then, adjust the display monitor to the brightness and contrast that you prefer.

Is there a flashing dash on the screen?

The flashing dash is the cursor. The system produces the cursor, but the message that should appear on the screen is produced by the software. Are you loading the operating system correctly (see "Disk Problems")?

If a number appears on the screen, see Table 5-2 in section 5.3. If a text message appears on the screen that indicates some sort of error has occurred, see Tables 5-3 through 5.5 in section 5.3.

If you can't find a message like the one that appears on the screen, your operating system is generating the message. Refer to the section on initial program load diagnostic messages in the user manuals for your operating system.

Disk Problems

Whenever you turn the system unit on or reset the system, the system first tries to load from drive A, the upper diskette drive, and then from drive C, the fixed-disk drive.

First, you will hear a beep to indicate a successful self-test. After a successful self-test, the in-use light on the front of drive A illuminates briefly. If the diskette in drive A cannot be loaded and the disk drive door is closed, an error message is displayed on the screen, and the system does not attempt to load from drive C. To continue, reload the system from a known good diskette, or remove the diskette and load the system from the fixed disk if possible.

If a diskette is not inserted in drive A or the drive door is open, the system tries to load from drive C. The fixed disk in-use light on the system unit front panel lights briefly while the system attempts to load from the fixed disk. A startup message is displayed when the loading starts.

If the startup message is not displayed, try the following first:

- If you did not hear the self-test beep, something may be wrong with the system unit.
- Is the display monitor connected and adjusted correctly? See "Display Monitor Problems."
- If your system is not configured, a CMOS error message is displayed (see Table 5-3 in section 5.3). Run the SETUP program (see Chapter 4). Then, reload the system.

Loading From Diskette

When the system attempts to read a diskette, the in-use light on the diskette drive comes on and stays on while the information is read from the diskette into the system's internal memory. If the light does not come on when you initially turn the power switch on or when you reset the system, it means the system is not attempting to read the drive.

Even if the drive door is open, the system should attempt to read the drive whenever you load the system. If something different happens, try the following.

- Did the system attempt to read the drive? (In other words, did the in-use light on the diskette drive door come on soon after you turned on the machine or reset the system?) If not, your problem is not with the diskette.

- Turn the system unit off, disconnect the system power cable, and check the cables inside the system unit. Ensure that the cables are secured properly (see Chapter 11). Then reconnect the system power cable and try to reload from diskette.
- If the system attempted to read the drive but a startup message is not displayed, try reinserting the diskette. Possibly the diskette was not seated properly. Turn the release lever to the unlocked position, and remove the diskette. Then, gently insert the diskette, label side up, into the drive (see Chapter 1). Push the diskette all the way in. There should be no resistance. Then, gently but firmly turn the release lever on the drive door to the locked position to close the drive door and lock the diskette in place. If you feel any resistance when you try to turn the lever, it may mean the diskette is not completely in. Remove the diskette and try reinserting it. If there is resistance, check to see if there is something in the diskette drive. Sometimes diskette labels come loose and stick in the drive.
- If, for some reason, the system tried to read the diskette but could not, an error message may appear on the screen (refer to section 5.3). Is the diskette loadable? Did you insert the diskette in the drive correctly? See Chapter 1. Try loading the system again from another diskette that you know is reliable.
- If the system does not read the drive or tries to read a loadable diskette that has been properly inserted but fails, your system unit or the diskette drive may need servicing by trained personnel. Call the Sperry Support Center or your over-the-counter repair facility.

Loading From the Fixed Disk

If the fixed-disk drive in-use light does not light when you load the system, even when drive A is empty and the door is open, something may be wrong with the fixed-disk drive. Try to isolate the problem.

- When you tried to load the system, did you hear the system self test beep? Did the system try to read drive A?
- Did the system attempt to read the fixed disk? The fixed disk in-use light on the system unit front panel lights whenever the system accesses the drive.
- Some operating systems require the fixed disk to be partitioned before you install the operating system or use the disk for file storage. If the in-use light on the system unit front panel comes on, but the message "No partition" appears, you need to create a partition before you can use your fixed disk. Refer to the user manual for your operating system on setting up the fixed disk. In some operating systems, this utility is called FDISK.
- The fixed disk must be formatted for your operating system. If the disk is not formatted correctly, the system displays disk I/O error messages whenever the system tries to read the disk. When you load the system, these messages generally mean that you have not formatted the disk.
- If you have loaded the system from the fixed disk without problems in the past, first turn the system unit off, disconnect the system power cable, and check the cables inside the system unit. Ensure that the cables are secured properly (see Chapter 11). Then, reconnect the system power cable and try to reload from the fixed disk.

- If this doesn't work, try reinstalling the operating system or the disk according to the instructions in your operating system user guide. This process involves reinitializing and formatting the disk, a process which erases the contents of the disk.
- If you set up the fixed disk correctly and are still unable to load the operating system from the fixed disk, your system unit or the fixed-disk drive could need servicing by trained personnel. Call the Sperry Support Center or your over the-counter repair facility.

Keyboard Problems

A problem with the keyboard can affect the way the system unit and display monitor respond. This makes it difficult to tell whether the keyboard is causing the problem.

If you suspect that the data you are entering through the keyboard is not being transmitted properly to the system unit, check the following.

- Certain problems are clearly caused by a faulty keyboard. Since the keyboard is a mechanical device with moving parts, purely mechanical problems can develop. For example, if a key begins to stick in either the depressed or released position, it could be something as simple as a bit of paper or dust that has fallen between the keys. Turn the system unit off and unplug the power cord. Gently pry up the keycap. If the keycap does not immediately begin to come loose, give up. Some keys may be jammed and require service. If you do pry the keycap up, look for something that has slipped down under the key mechanism. Sometimes you can blow it loose. Put the keycap back on and try it again. If it still sticks, the keyboard requires service.

- If you press a key and the wrong character appears on the screen, it could be caused by problems in the system unit or by problems with the software. Try a different software diskette. If the problem continues, both the system unit and the keyboard may require servicing.

System Unit Startup Test

Since the system unit is the central controller for the entire PC, it is often difficult to determine if problems are originating there. The system unit startup test is designed to locate problems within the system unit itself.

This test is conducted with peripheral units such as printers disconnected from the system unit. The test uses the system unit's built-in speaker and the monitor screen as the output devices to specify trouble codes.

- Turn the system unit off. Disconnect all cables from the system unit except the keyboard cable, the monitor power and signal cables, and the system unit power cable. Open the diskette drive doors and remove all diskettes. Make sure the system unit power cord is plugged into a working electrical outlet.

- Turn on the system unit, then insert the diagnostics diskette distributed with your PC into diskette drive A, and close the latch. The system startup test is executed in the following order:

1. The fan on the system unit rear panel starts, and the power-on light on the front panel turns on (Figure 5–7).

2. If a fixed-disk drive is installed, the fixed-disk drive in-use light turns on briefly.

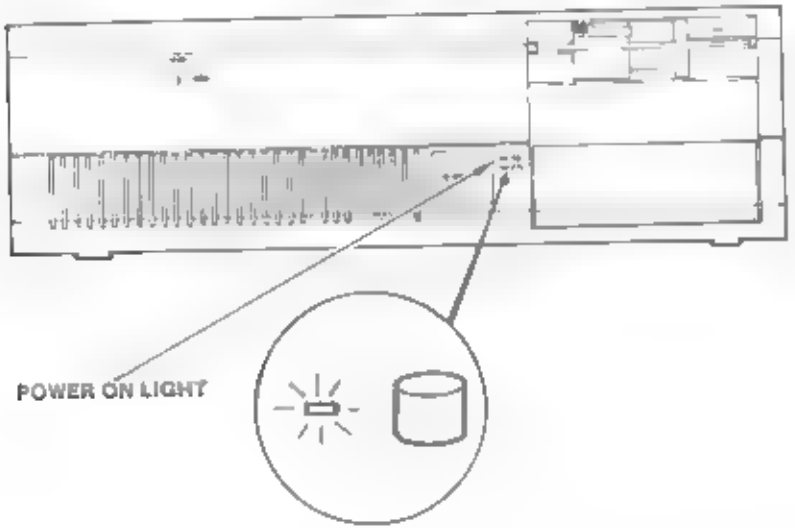


Figure 5–7 System Startup Test — Power On and Fixed-Disk Drive

3. The names of the tests being performed are displayed in the upper left-hand corner of the screen.

4 If all the self tests are good, the system issues one short beep. The cursor is displayed in the upper left-hand corner of the display monitor (Figure 5-8) and the drive A in-use light turns on. Then the A>DIAGX message is displayed (see section 5.1).

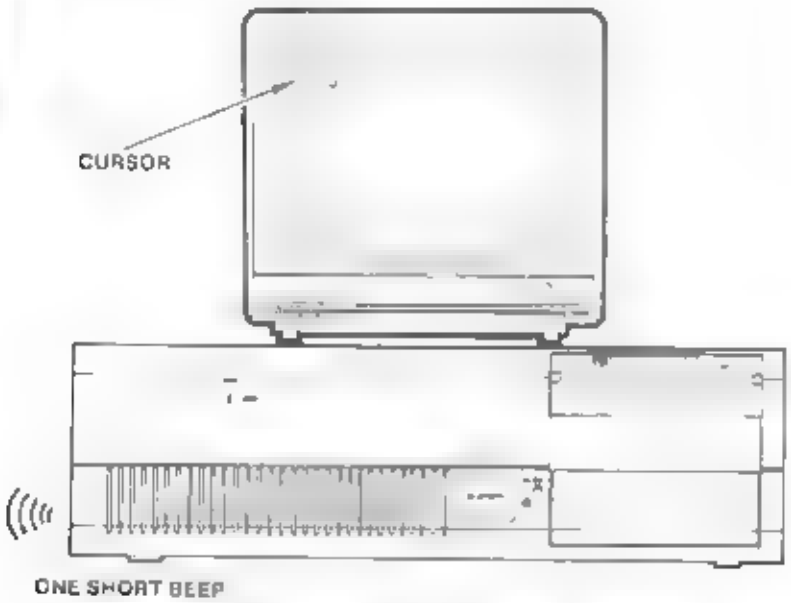


Figure 5-8 System Startup Test - Beep and Mon

5 If an error occurs, you will usually hear one or more beeps and an error message is also displayed. Table 5-1 defines the possible errors. Use the location information to try to correct the problem by following the procedures at the beginning of this section. For example, if the error message is E KB20, check the keyboard.

Then press the system unit reset button. If the same error message appears, report the error message to the Sperry Support Center or your over-the-counter repair facility.

If you hear beeps but no error message is displayed, the display monitor may be malfunctioning. Use the beeps to identify the error message.

Get a pencil and a piece of paper. Get ready to jot down the number and duration of any beeps you hear from the system unit's speaker. In this section, a dash (-) indicates a high pitched beep of about a half second, and a dot ( ) indicates a lower pitched, very short beep (only a fraction of a second). If you use this notation system to record what you hear, you will be able to make quick comparisons using Table 5-1.

6 If an error message is displayed, refer to Table 5-1 or section 5.3 to interpret the message.

Table 5-1 Diagnostic Signals

Beeps	Error Message	Location of Error
no beep	no message	80286 CPU ROM Timer Memory Refresh Circuit
	E DM10 E DM20 E DM30	DMA 1 DMA 2 DMA Page Register
	E MM10-nnnn-nnnn-nnnn-nnnn E MM20-nnnn	Memory Memory
	E T10 E T20	
	E TM10	
	E KB10 E KB20	
	E VM10 E VM20	Monochrome Monitor (Video RAM) Color Monitor (Video RAM)
	E CF10 E CF20	
	E TD10	
	E PM10	
	E FD10	
no beep	E FXD1 E FX10 E FX20	
	E MMP1-nnnn-nnnn-nnnn-nnnn E MMP2-nnnn	Memory Expansion

Notes: In this table, a dash [illegible] indicates a lower-pitched, very short beep; only a [illegible]

5.3. Error Messages

Tables 5-2 through 5-5 indicate the meaning of various error messages

Table 5-2 Diagnostic Error Codes (Part 1 of 2)

Code	Error
1	80286 defect
1	Fixed disk configuration error or 8259A IR control error
2	8253 time count up signal defect
3	[illegible]
4	[illegible]
5	[illegible] defect
6	286M CPU [illegible]
7	[illegible] or ID RAM error
8	[illegible] RAM parity check error, chip defect
9	[illegible]
A	Keyboard scan code error
B	[illegible]
C	[illegible] recovery error
D	[illegible] system error
E	Monochrome monitor adapter error
F	Monochrome attribute error
10	[illegible] monitor controller error
11	[illegible]
12	CRT VRAM error
13	GCU error

Table 5-2 Diagnostic Error Codes (Part 2 of 2)

Code	Error
20	Printer interface error
21	Not used
22	Not used
23	Fixed disk data compare error
24	Fixed disk or diskette drive bad command
25	Fixed disk or diskette drive address mark not found
26	Fixed disk or diskette drive write protect error
27	Fixed disk or diskette drive unexpected end of data
28	Fixed disk or diskette drive data CRC error
29	DMA boundary error
30	Fixed disk bad track detect
31	Fixed disk ECC error
32	Fixed disk controller error
33	Fixed disk SEEK error
34	Fixed disk timeout error
35	Fixed disk sense operation error
36	Not used
37	Fixed disk power on self test (POST)
38	Not used
39	Fixed disk type mismatch error
40	Fixed disk drive not ready
41	Fixed disk invalid response data for diagnostics
42	Fixed disk write fault

Table 5-3. CMOS Error Messages

Error Message	Meaning
CMOS POWER FAIL Continue "F1" KEY	Try and Press Function key 1 (F1)
CMOS CHECK SUM FAIL Continue "F1" KEY	CMOS corrupted Enter run SETUP
MONITOR UNMATCHED Continue "F1" KEY	CMOS configured monitor does not match system monitor
CMOS MEMORY SIZE FAIL Continue "F1" KEY	CMOS configured memory capacity does not match self-test memory size
CMOS TOD FAIL Continue "F1" KEY	Errors detected in the TOD

Table 5-4 Warning Messages

Error Message	Meaning
CMOS FXD INIT FAIL Continue F1 KEY	Errors detected in fixed disk drive initialize routine
O EXT ROM ERROR (nnnn)	Read error in I/O ROM
KEY LOCKED Continue F1 KEY	System Unit key is locked and keyboard input is masked

Table 5-5 Operating System Boot Error Messages

Code	Message
F 001	FDD Boot Record Bad
F 002	FDD Not Ready
F 003	FDD Boot Record Read Error
F 004	FXD Boot Record Read Error
F 005	FXD Boot Record Bad

FDD is Flexible Diskette Drive

5.4. Fixed Disk Initialization

> **CAUTION**
>
> All data on the fixed disk is destroyed by formatting

Although fixed disks are physically formatted at the factory, you should use the fixed disk physical format (FXDFMT) routine to physically format (reinitialize) the disk before you load your operating system. You should also run FXDFMT if you encounter fixed disk errors. During reinitialization, FXDFMT "retires" bad sectors and tracks so that these areas of the disk are not used to store files.

Fixed disks usually contain a certain number of bad spots. A bad sector or track is indicated by error 30 or error 31 (see "Diagnostic Error Codes" in Section 5.3). These errors are reported during fixed disk diagnostics AFTER you reinitialize a fixed disk. Contact the Sperry Support Center or your over-the-counter repair facility if the sum of error 30 and error 31 messages exceeds 1 per megabyte of fixed disk (e.g., 40 errors for a 40MB disk).

After reinitializing the fixed disk, use the FDISK utility to set up one or more MS-DOS partitions on the disk (see Chapter 9 of your MS-DOS User's Guide). Then, use the MS-DOS FORMAT utility to prepare the fixed disk for use by MS-DOS.

Initializing The Fixed Disk

1. Insert the system diskette into the upper diskette drive (drive A) in the system unit and load the system. (Refer to your MS-DOS User's Guide.)

2. When the A> prompt is displayed, replace the system diskette with the diskette containing the FXDFMT routine. Enter **FXDFMT** and press **Return** or **Enter**.

```
A>FXDFMT
```

3. The following message and drive select prompt appear

```
FIXED DISK PHYSICAL FORMATTER Vxxx

DRIVE select "C" or "D" ?
```

Where Vx xx is the version of the formatter

4 Enter the letter for the fixed-disk drive you are formatting. The following message and prompt appear

```
TYPE NUMBER of DRIVE x is yy
Is TYPE NUMBER correct ? (Y/N)
```

Where "x" is C or D and "yy" is the drive type number (0- 5)

5. If the fixed disk drive type number is correct, enter Y, and continue with step 6. If the fixed-disk drive type number is not correct, enter N. The following message is displayed

```
Run the SETUP program to change the type
number

Press ESC
```

Press ESC, and when the A> prompt reappears run the SETUP procedure described in Chapter 4 of this installation guide by entering SETUP, as shown below

```
A>SETUP
```

6 If you entered Y, the following prompt is displayed

```
Bad track list
     Surface test                 --S
     Read bad track list from FDD  F
Enter (S/F
```

Enter S and continue with step 7, or enter F and continue with step 8

7 The first time the FXDFMT program is run on the fixed disk, you should enter S. The surface test reads the bad tracks marked on the disk by the manufacturer and displays this list on the screen as a "current bad track list". At the end of this program, a bad track list (bad map) is written (saved) onto the FXDFMT diskette. The diskette will not contain the bad track list until this is done.

The following screen is displayed for the surface test

```
FIXED DISK PHYSICAL FORMATTER Vxxx

Bad track searching
```

The cylinders being tested are displayed in a running count in the upper right corner of the screen. As bad tracks are found, the cylinder and head number are listed on the screen. The following example screen lists 10 bad tracks

8. For the second or subsequent running of the FXDFMT program, the FXDFMT diskette contains the list of bad tracks (the BADx.MAP). Therefore, you can save time by entering F to read the bad track list from the diskette (instead of doing a surface test).

   When you enter F, the bad track list is read from the diskette and displayed as the "current bad track list". Continue with step 9. If the diskette does not have a bad track list, the following message appears:

   ```
   BADx.MAP  not found!

   Abort, Retry, Create (BADx.MAP)
   ```

   Where "x" is 0 for drive C, or 1 for drive D.

   At this time a "Retry" does not help. Abort causes you to exit the FXDFMT program. Create initializes a "bad map" on the diskette. However, there is nothing in the map at this time. You then continue with a blank "current bad track list" screen as shown in step 9. All bad cylinders and heads must be entered from the keyboard. Continue with step 10.

9. When the bad track list is read from the diskette (step 8), or when the bad track searching is complete (step 7), a "Current bad track list" screen is displayed. The following is an example screen display using the 10 bad tracks found in step 7.

   ```
                  *** Current bad track list ***

   CY HD CY HD CY-HD CY-HD CY HD CY HD CY HD CY HD CY HD

   0070-0  0071-0  0132-1  0160-1  0558-4  0657-4  0706-0  0864-1  0881-2
   0002-1


   Do you want to add any other bad tracks? (y/n)
   ```


10. Compare the displayed "Current bad track list" with the manufacturer's list of bad tracks (located on the top of the fixed-disk drive). If there are bad tracks listed by the manufacturer that were not detected by the bad track search, enter Y and then enter the additional bad tracks one at a time. The bad tracks on this list are not used by MS-DOS.

    Otherwise, enter N and continue with step 15.

    A yes answer makes the question line appear as follows:

    ```
    Do you want to add any other bad tracks? (y/n)  CY
    ```

11. Type a four-digit cylinder number (represented by xxxx) and press Return or Enter. The following appears:

    ```
    Do you want to add any other bad tracks? (y/n).  CY HD  xxxx y
    ```

    If the cursor returns to the beginning of the number, the cylinder number has not been accepted. This means the [illegible] use this cylinder, even if it is on the [illegible]. Type a new number.

    Type a one or two-digit head number (represented by y). The screen asks:

    ```
    CY HD  xxxx y [Y/N]?
    ```

    Type Y, to add this track to the "Current bad track list". Return to step 10.

    If you type N, the cylinder-head number is erased without adding it to the list. Return to step 10. This allows you to enter any track and exit the program without affecting the "Current bad track list".

12. A no answer to adding a bad track causes the following message to appear:

    ```
    Press any key to start FORMAT
    ```

> **NOTE**
>
> Entering CTRL C at any time up to this point always lets you exit the FXDFMT program without affecting the fixed disk.

16. Press **Return**, or any key, to start the fixed disk formatting. The following message is displayed and a running cylinder count (starting from 0000) is displayed in the upper right corner of the screen

FORMATTING START

17. When the formatting is complete, the following message is displayed and the write read comparison is started. Again, a running cylinder count (starting from 0000) is displayed in the upper right corner of the screen

18. When the write/read comparison completed, the following screen is displayed

A>

When the A> prompt reappears, your fixed disk is now physically formatted or initialized.

> **NOTE**
>
> Before using the fixed disk with MS-DOS, you must prepare the fixed disk with the FDISK and FORMAT commands on the MS-DOS diskette. Refer to the MS-DOS User's Guide for more information.

Chapter 6. 80287 Math Coprocessor Installation

6.1. Chip Location

Figure 6-1 shows the location for inserting the 80287 math coprocessor chip on the system board.

NOTE

A integrated circuit chips are sensitive to static electricity. Do not remove the chip from its antistatic packaging until you are ready to insert it into its socket.

Before handling the chip, touch an unpainted portion of the system unit chassis for a few seconds. This will help to discharge any static electricity you may have accumulated

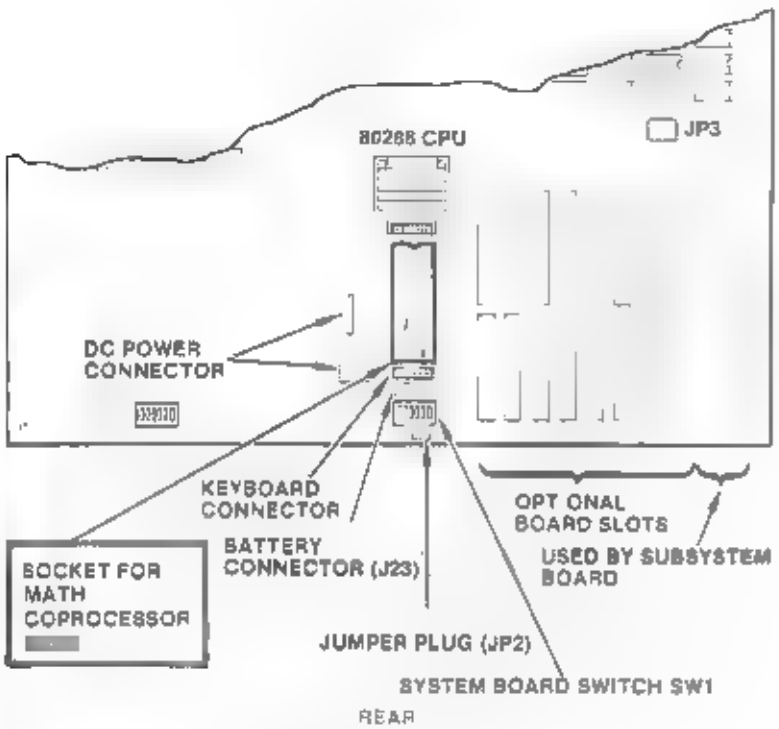


Figure 6-1 80287 Math Coprocessor Location

6.2. Installing the Math Coprocessor

1. Remove the system unit cover as described in section 3.2
2. If controller boards are blocking access to the math coprocessor socket on the system board (Figure 6-1) remove the controller boards as described in section 2.4
3. After discharging any static electricity from your hand, remove the math coprocessor from the antistatic package
4. Install the chip by aligning the coprocessor pins with the socket connectors. Be sure the notch at one end of the chip faces the notch on the socket (Figure 6-2). Press firmly

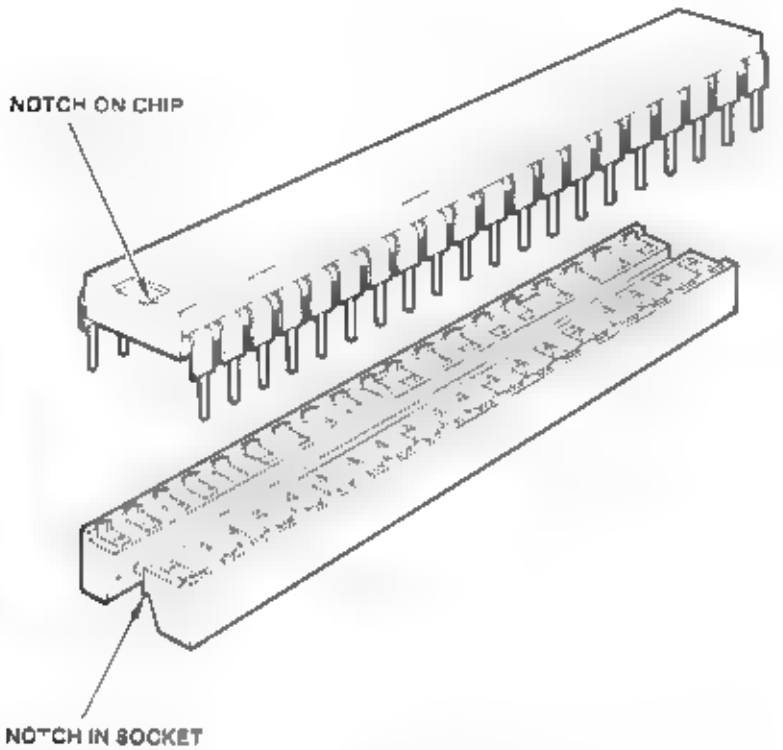


Figure 6-2. Inserting the Math Coprocessor

5 If any boards were removed to provide access for this installation, replace the boards. Refer to section 2.4.

6 If this is the last option to be installed, return to section 3.6. If you have another option to install, continue with the appropriate chapter (see section 3.5).

Chapter 7. Memory Chip Installation

Your PC system unit comes equipped with 512K bytes or 1M byte of memory installed on the system board. If you only have 512K bytes, the system board has expansion sockets for adding 18 memory chips (another 128K or 512K bytes of memory). Adding these chips brings the on-board memory up to 640K or 1M byte. Figure 7-1 shows the location of the memory sockets.

You can also increase memory by adding memory expansion boards (Chapter 9). This memory, referred to as extended memory, is configured starting at 1M byte. On-board memory and extended memory may be configured separately. That is, you don't have to have 1M byte of on-board memory before you add memory expansion boards. However, you create a "hole" in the memory map when you add extended memory without filling on-board memory to 1M byte. In MS-DOS, extended memory is used only for virtual disks. See the MS-DOS User's Guide for information on virtual disks.

> NOTE
>
> All integrated circuit chips are sensitive to static electricity. Do not remove the chips from their antistatic packaging until you are ready to insert them into their sockets.
>
> Before handling chips, touch an unpainted portion of the system unit chassis for a few seconds. This will help to discharge any static electricity you may have accumulated.

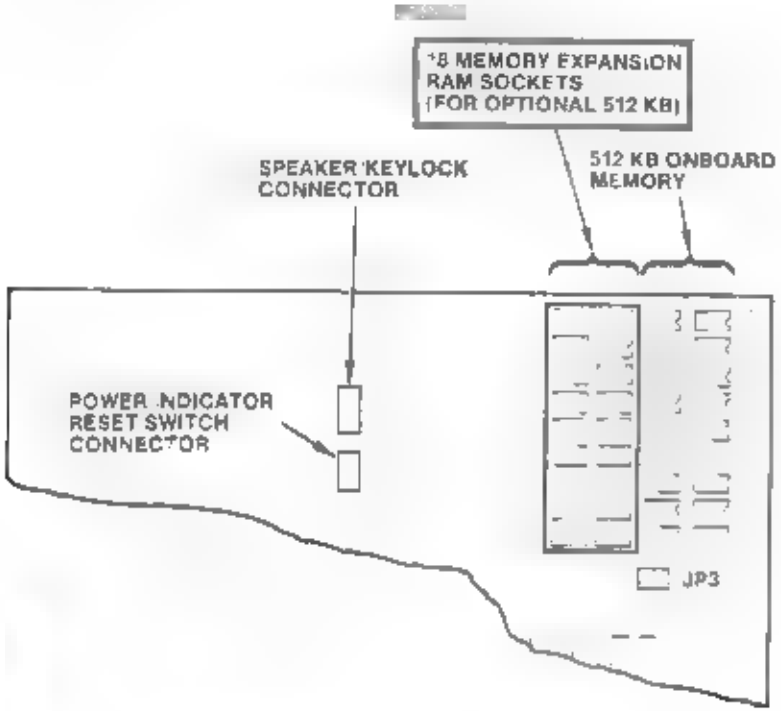


Figure 7–1. Optional Memory Chip Location

7.1. Installing Memory Chips

1. Remove the system unit cover as described in section 3.2.
2. If controller boards are blocking access to the expansion memory sockets on the system board (see Figure 7–1), remove the controller boards, as described in section 2.4.
3. After discharging any static electricity from your hand, remove a memory chip from the anti-static package.
4. Install the chip by aligning the memory chip pins with the socket connectors. Be sure the notch at one end of the chip faces the notch on the socket (Figure 7–2). If the notch on the socket is hard to see, note the direction of notches on memory chips already installed. Press firmly.
5. Repeat this process for each chip.
6. If any boards were removed to provide access for the chips, replace the boards. Refer to section 2.4.

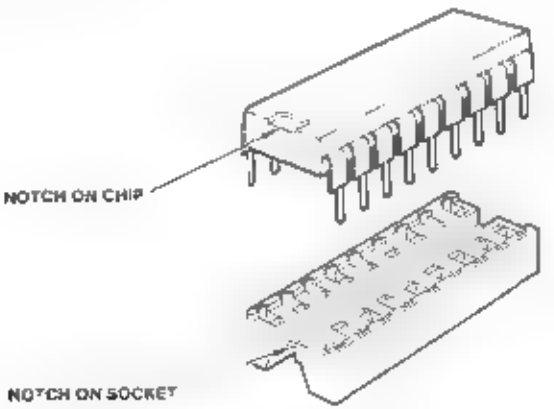


Figure 7-2. Inserting a Memory Chip

7.2. Setting Memory Usage

The amount of system board memory is set by means of switch SW1–3 and jumper plug JP2 or by SW1–3 and SW1–5, depending on the location of SW1 on the system board (see Figure 2–3). If SW1 can be accessed through the system unit rear panel, use SW1–3 and SW1–5. Otherwise, use SW1–3 and JP2.

Use Table 7–1 or the memory maps shown in Figure 7–3 to help you determine the amount of memory your system will be using.

> NOTE
>
> If the system board has 1M byte of memory, you can select the amount of user memory which will be used
> - 640K (for standard MS-DOS operation)
> - 1M (for MS-DOS operation with virtual disk)
> - 256K/512K (for special feature boards)

1. If the system board has only 512K bytes of memory, set switch SW1–3 OFF and install jumper plug JP2 (or set switch SW1–5 ON). This is memory mode A.

2. If the system board has 1M byte of memory which will be used for the standard MS-DOS operation of 640K, set switch SW1–3 OFF and remove jumper plug JP2 (or set SW1–5 OFF). This is memory mode C.

3. If the system board has 1M byte of memory which will be used for MS-DOS with virtual disks configured, or will provide the maximum available memory for XENIX or other large operating systems, set SW1–3 ON and remove jumper plug JP2 (or set SW1–5 OFF). This is memory mode D.

4. If you are using a feature board which requires user memory addressed as 256K/512K bytes (e.g., PC Mapper), set SW1–3 ON and install jumper JP2 (or set SW1–5 ON). This is memory mode B. Then, in SETUP (Chapter 4), select 640K for base memory capacity.

5. If this is the last option to be installed, return to section 3.6. If you have another option to install, continue with the appropriate chapter (see section 3.5).

Table 7–1 Setting Memory Usage

On-Board Memory Use	Switch Settings SW1–3	JP2/SW1–5	Memory Mode*	Expansion Board Address Starts at	Comments
512K	OFF	ON	A	1M	
640K	OFF	OFF	C	1M	Requires 1M byte in memory chips on system board
1M	ON	OFF	D	1.5M	Requires 1M byte in memory chips on system board
256K/512K	ON	ON	B	1.5M	Requires 1M byte in memory memory chips on system board

*Memory mode corresponds to Figure 7–3.

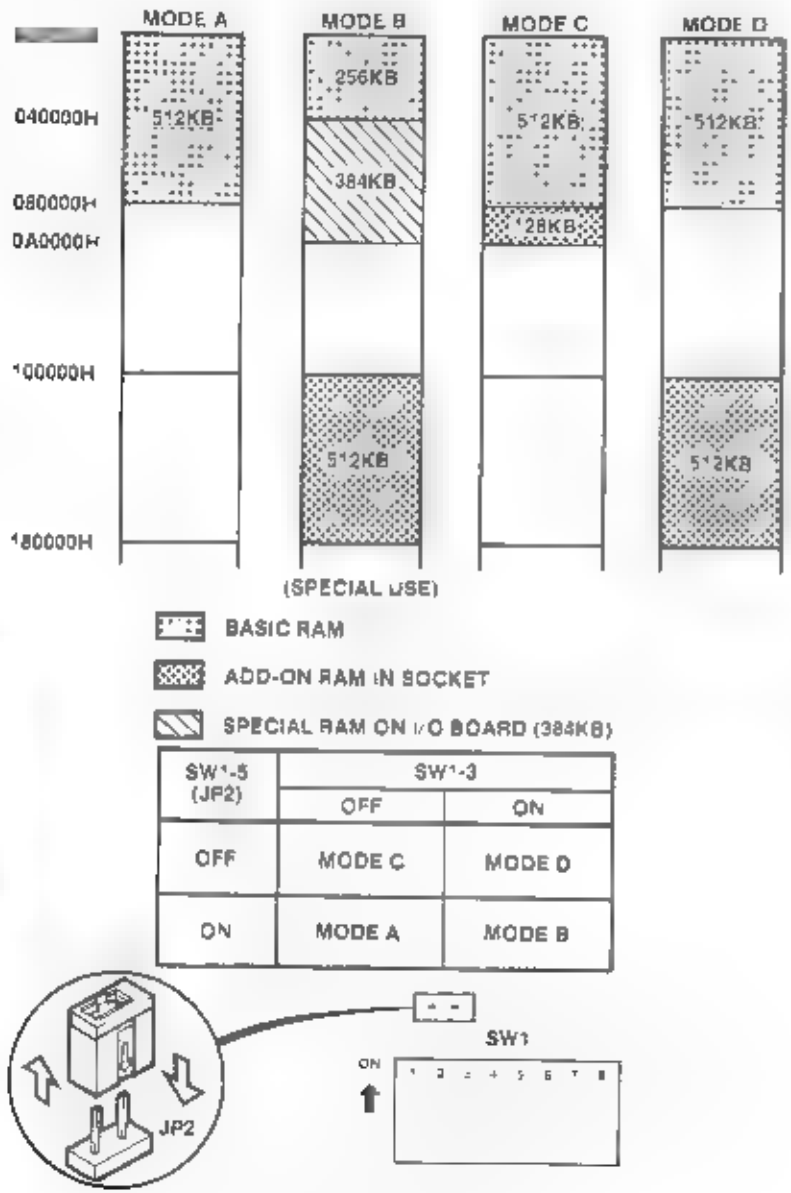


Figure 7-3. Memory Mapping

Chapter 8. Monitor Controller Installation

Each monitor requires that the appropriate monitor controller board be installed in the system unit. Install the controller board as follows:

1. Remove the system unit cover as described in section 3.2.

2. Determine the system board location for the monitor controller board. You can use any location which fits the connector.

3. Remove the metal cover from the system unit connector panel for the appropriate location (refer to section 2.4).

4. Holding only the edges of the controller board, align the front edge with the guide and carefully push the controller board straight down so that the bottom edge locks firmly into the connector on the system board. Make sure the bottom edge of the metal bracket on the controller board fits into the slit in the bottom of the system unit chassis.

   If the controller board does not fit completely into place (the metal bracket will not go all the way down), it may be stopped by the double connector on the system board. Move the controller board to a single connector position.

5. Using the screw that you removed from the metal cover, firmly tighten the controller board metal bracket to the connector panel (refer to section 2.4).

6. Repeat steps 1 through 5 if you have a second monitor controller board to install.

7. Using a ball point pen, set switches SW1–4 and SW1–8 on the system board to indicate what type of monitor is connected (see Figure 8-1).

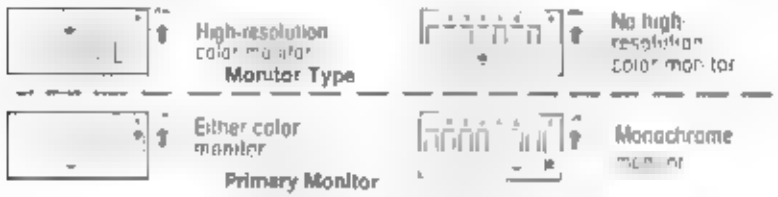


Figure 8-1. Primary Monitor Switch Settings

SW1–4 indicates whether the system has a high-resolution monitor. Set SW1–4 to ON if a high-resolution monitor is connected. Set SW1–4 to OFF if no high-resolution monitor is connected.

If the system has only one monitor, SW1–8 specifies the type of monitor. If the system has two monitors, SW1–8 determines which monitor is the primary monitor (the one that is active when the system is loaded). Set SW1–8 to ON if a color monitor is the only or primary monitor. Set SW1–8 to OFF if a monochrome monitor is the only or primary monitor.

8. If this is the last option to be installed, return to section 3.6. If you have another option to install, continue with the appropriate chapter (see section 3.5).

Chapter 9. Memory Expansion Board Installation

You can install one or two memory expansion boards. Each memory expansion board allows you to add 2M bytes of additional memory. This memory is divided into four banks of 512K bytes each. There are four switches on the memory board, one for each bank, as shown in Figure 9-1. Each switch determines the starting address for that bank of memory.

The memory expansion board must be installed in a slot with a double connector.

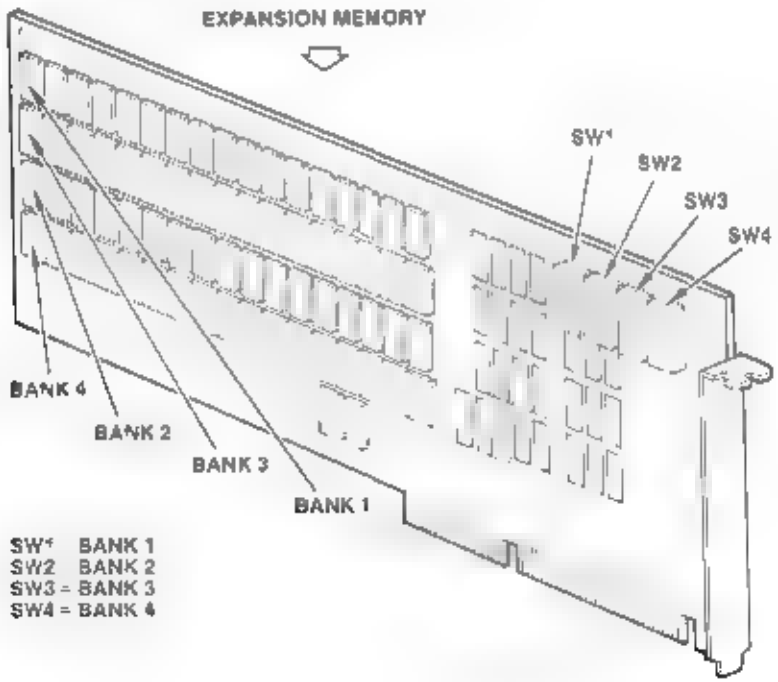


Figure 9-1. Memory Expansion Board

9.1. Memory Address Switches

Setting the memory expansion board switches depends on how the system board memory switches (and jumper plug) are set. The expansion memory must be contiguous. Therefore, the system board memory settings determine the starting address (1M byte or 1.5M byte) for the expansion memory. Refer to Table 7–1 and Figure 7–3 in Chapter 7

A standard memory setting is described below. Other memory settings can be used, as explained in section 9.3.

1. If the system board has been set for 512K or 640K bytes of user memory (SW1–3 OFF), set the switches on the memory board as shown in Figure 9–2. Figure 9–2 shows the settings for the first and second memory boards

2. If the system board is set for 1M byte or 256K/512K of memory (SW1–3 ON), set the switches as shown in Figure 9-3. Figure 9–3 shows the settings for the first and second memory boards

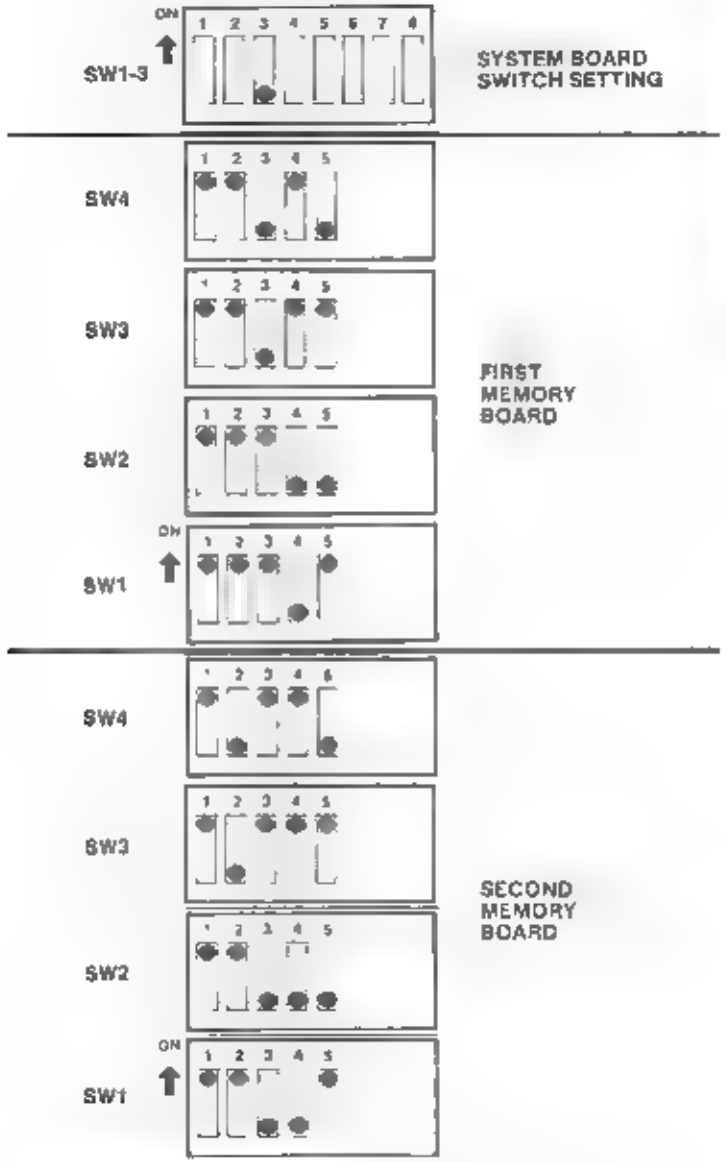


Figure 9-2 Memory Board Switch Setting When SW1-3 Is OFF

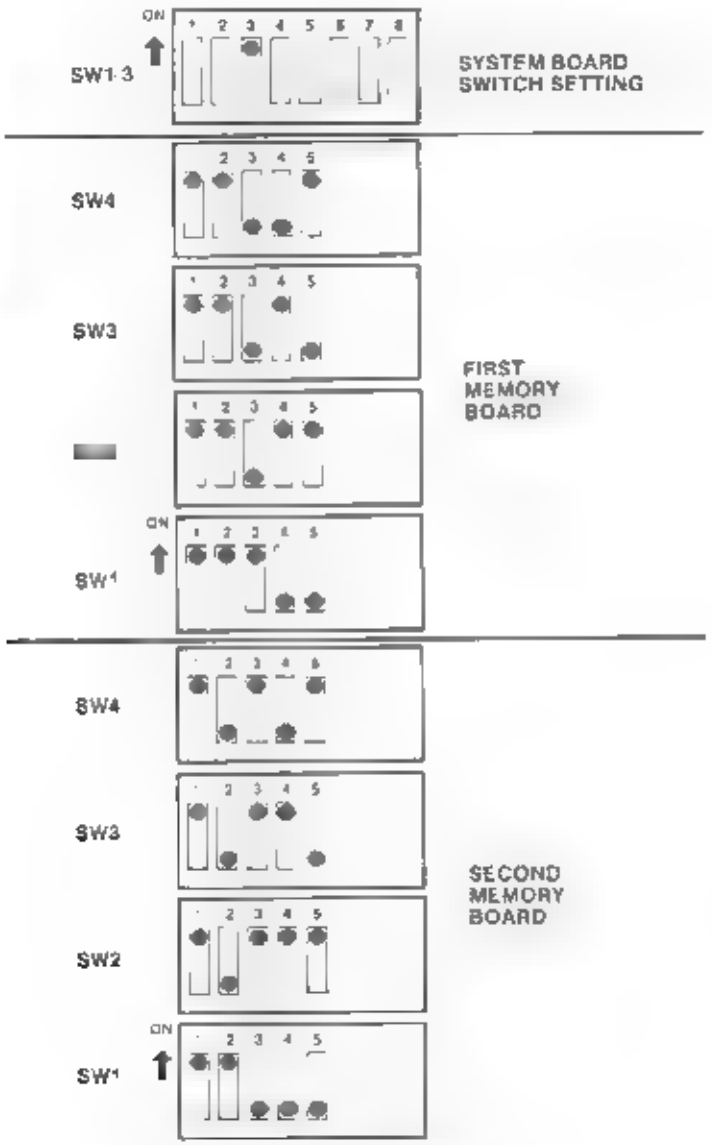


Figure 9-3 Memory Switch Setting When SW1-3 is ON

9.2. Board Installation

1. Remove the system unit cover as described in section 3.2.
2. Determine the system board location for each memory expansion board (remember, it requires a double connector)
3. Remove the metal cover from the system unit rear panel for the appropriate location (refer to section 2.4)
4. Holding only the edges of the memory board, align the front edge with the guide and carefully push the board straight down so that the bottom edge locks firmly into the connectors on the system board. Make sure the bottom edge of the metal bracket on the memory board fits into the slit in the bottom of the system unit chassis
5. Using the screw that you removed from the metal cover, firmly tighten the memory board metal bracket in place on the connector panel (refer to section 2.4).
6. If this is the last option to be installed, return to section 3.6. If you have another option to install, continue with the appropriate chapter (refer to section 3.5)

9.3. Additional Information on Memory Addressing

Switches SW1 through SW4 each control a different bank of 512K byte memory as shown in Figure 9-1. Set switches SW1 through SW4 on the memory expansion board for the starting address of each 512K-byte block of add-on memory (refer to Table 9-1). Memory addresses must be set so that memory is contiguous. Using a ballpoint pen or small screwdriver, slide microswitches 1 through 5 either ON or OFF, according to Table 9-1 (and Figures 9-2 and 9-3).

If the 18 expansion sockets on the system board are not filled, start the memory board address with the third line in Table 9-1. If the system board has the 18 expansion memory sockets filled refer to section 7.2 to determine whether the memory board addresses start with the third or the fourth line in Table 9-1.

Each line in Table 9-1 represents one switch setting (five microswitch settings), and these lines should be used in groups of four for SW1 through SW4.

Table 9-1. Memory Board Address Settings

Microswitch Settings					Address
1	2	3	4	5	
ON	ON	ON	ON	ON	Do not use
ON	ON	ON	ON	OFF	Do not use
ON	ON	ON	OFF	ON	1024 KB–1536 KB *
ON	ON	ON	OFF	OFF	1536 KB–2048 KB
ON	ON	OFF	ON	ON	2048 KB–2560 KB
ON	ON	OFF	ON	OFF	2560 KB–3072 KB
ON	ON	OFF	OFF	ON	3072 KB–3584 KB
ON	ON	OFF	OFF	OFF	3584 KB–4096 KB
ON	OFF	ON	ON	ON	4096 KB–4608 KB
ON	OFF	ON	ON	OFF	4608 KB–5120 KB
ON	OFF	ON	OFF	ON	5120 KB–5632 KB
ON	OFF	ON	OFF	OFF	5632 KB–6144 KB
ON	OFF	OFF	ON	ON	6144 KB–6656 KB
ON	OFF	OFF	ON	OFF	6656 KB–7168 KB
ON	OFF	OFF	OFF	ON	7168 KB–7680 KB
ON	OFF	OFF	OFF	OFF	7680 KB–8192 KB
OFF	ON	ON	ON	ON	8192 KB–8704 KB
OFF	ON	ON	ON	OFF	8704 KB–9216 KB
OFF	ON	ON	OFF	ON	9216 KB–9728 KB
OFF	ON	ON	OFF	OFF	9728 KB–10240 KB
OFF	ON	OFF	ON	ON	10240 KB–10752 KB
OFF	ON	OFF	ON	OFF	10752 KB–11264 KB
OFF	ON	OFF	OFF	ON	11264 KB–11776 KB
OFF	ON	OFF	OFF	OFF	11776 KB–12288 KB
OFF	OFF	ON	ON	ON	12288 KB–12800 KB
OFF	OFF	ON	ON	OFF	12800 KB–13312 KB
OFF	OFF	ON	OFF	ON	13312 KB–13824 KB
OFF	OFF	ON	OFF	OFF	13824 KB–14336 KB
OFF	OFF	OFF	ON	ON	14336 KB–14848 KB
OFF	OFF	OFF	ON	OFF	14848 KB–15360 KB
OFF	OFF	OFF	OFF	ON	15360 KB–15872 KB
OFF	OFF	OFF	OFF	OFF	15872 KB–16384 KB

*Do not use if SW1-3 on the system board is ON.

An examp e of how to set the two memory board switches is g ven in Table 9-2

With system board switch SW1 3 ON (1M byte of memory on the system board), the amount of memory indicated by the first three lines of Table 9-2 is used (configured) on the system board. The first bank of memory on the first memory board should have switch SW1 set to start with 1536K bytes through 2048K bytes. Switches SW2, SW3, and SW4 should follow in order. The switch for the first bank of memory on the second memory board should be set to start first with 3584K bytes through 4096K bytes. Switches SW2, SW3, and SW4 on the second board fo ow in order.

t does not matter where the memory boards are located on the system board. However, the switches on both memory boards must be set for contiguous memory.

Table 9-2 Example of Memory Board Switch Sett ngs

Microswitch Settings					Address
	2	3	4	5	
ON	ON	ON	ON	ON	Do not use
ON	ON	ON	ON	OFF	Do not use
ON	ON	ON	OFF	ON	1024 KB – 1536 KB *
ON	ON	ON	OFF	OFF	1536 KB – 2048 KB (SW1)
ON	ON	OFF	ON	ON	2048 KB – 2560 KB (SW2)
ON	ON	OFF	ON	OFF	2560 KB – 3072 KB (SW3)
ON	ON	OFF	OFF	ON	3072 KB – 3584 KB (SW4)
ON	ON	OFF	OFF	OFF	3584 KB – 4096 KB (SW1)
ON	OFF	ON	ON	ON	4096 KB – 4608 KB (SW2) 2
ON	OFF	ON	ON	OFF	4608 KB – 5120 KB (SW3)
ON	OFF	ON	OFF	ON	5120 KB – 5632 KB (SW4)

* Do not use if SW1 3 on the system board is ON

Chapter 10. Multiterminal Adapter Board Installation

This chapter gives information on installing the multiterm na adapter board, also called a quad asynchronous commun ca-tions control unit (CCU). Each board allows the PC to communicate w th four asynchronous RS-232-C devices, usually terminals. A maximum of two multiterminal adapter boards can be nstalled.

The multiterminal adapter board is easily identified by the double metal bracket attached to the board. This bracket has four 9-pin, D-shaped I/O connectors (Figures 10-1 and 10-3). To use 25-pin terminals, you must install a terminal adapter cab e (section 10.3).

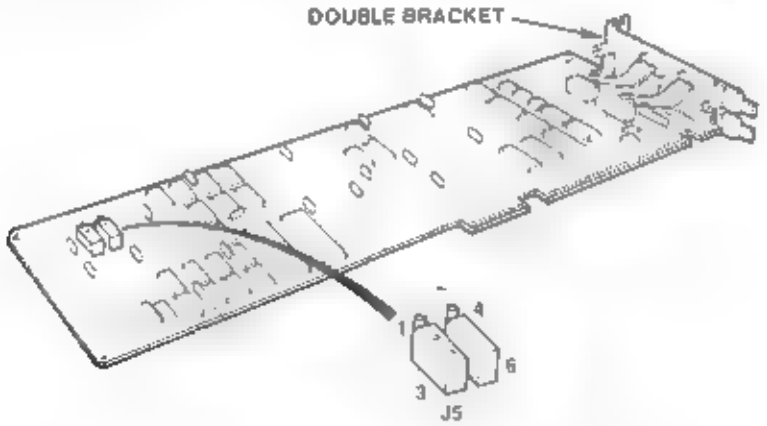


Figure 10-1 Multiterminal Adapter Board

10.1. Jumper Plug Installation

The two jumper plugs which determine the board I/O and interrupt addresses are easier to install before the board is placed in the system unit. Figure 10–2 shows the location of the jumper plugs on the board and the associated I/O port numbers, hexadecimal I/O addresses, and interrupt addresses.

Since the subsystem board (which comes already installed in the system unit) has asynchronous I/O ports 1 and 2, the first multiterminal adapter board should be set for ports 3 through 6, as shown in Figure 10–2. The second board then uses ports 7 through 10.

1. Install the two jumper plugs on the first board as indicated in Figure 10–2.
2. If you have a second board, install the jumper plugs as indicated for the second board in Figure 10–2.

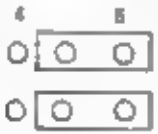
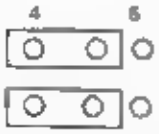
	JUMPER PLUG (J5) INSTALLATION	PORT NO.	I/O ADDRESS (HEX)	INTERRUPT ADDRESS
FIRST BOARD		3 4 5 6	400 — 407 410 — 417 420 — 427 430 — 437	440
SECOND BOARD		7 8 9 10	408 — 40F 418 — 41F 428 — 42F 438 — 43F	448

Figure 10-2 Multiterminal Adapter Board Jumper Plug Installation

10.2. Board Installation

1. Remove the system unit cover, as described in section 3.2.
2. Determine the location for the board (refer to section 2.4).
3. Remove the metal covers from two adjoining available slots of the system unit rear panel (refer to section 2.4).
4. Holding only the edges of the controller board, align the front edge with the guide and carefully push the controller board straight down so that the bottom edge locks firmly into the connector on the system board. Make sure the bottom edges of both metal brackets on the controller board fit into the slits in the bottom of the system unit chassis.
5. Using the screws that you removed in step 3, firmly tighten the controller board metal brackets in place on the connector panel (refer to section 2.4).

10.3. Terminal Cable Connections

Looking at the rear of the system unit, the asynchronous I/O connectors are numbered top to bottom, right to left, starting with port 3 at the top right. The connectors are 9-pin, RS-232-C type (Figure 10–3).

If the terminals to be connected have 25-pin connectors, you must install a terminal adapter cable for each terminal (Figure 10–4).

1. If the terminal has a 9-pin connector, connect it and skip to step 3.
2. If the terminal has a 25-pin connector, attach the 25-pin connector on the cable to the terminal. Then attach the 9-pin connector on the cable to the system unit.
3. If this is the last option to be installed, return to section 3.6. If you have another option to install, continue with the appropriate chapter (refer to section 3.5).

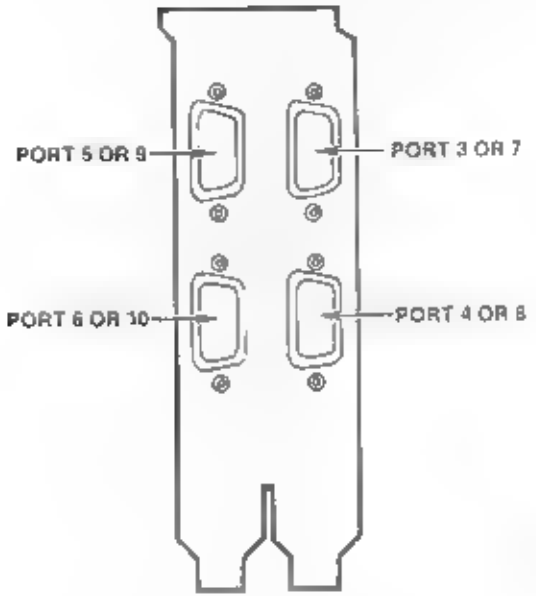


Figure 10–3. Multiterminal Adapter Board Port Numbering

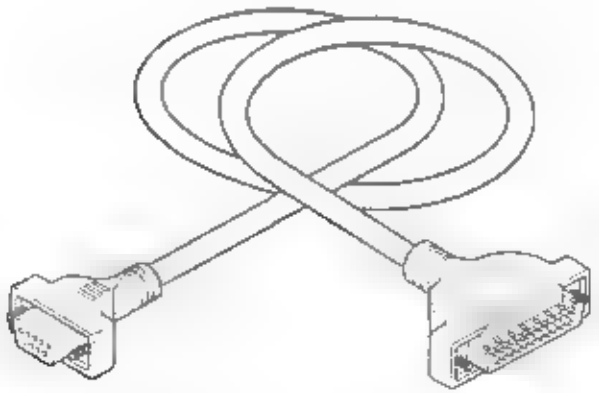


Figure 10–4. Terminal Adapter Cable

Chapter 11. Diskette Drive and Fixed-Disk Drive Installation

11.1. General Information

This chapter provides information on how to install a second diskette drive and how to install one or two fixed-disk drives and the associated fixed disk drive controller board. If you are installing a second diskette drive, its controller is already a part of the system unit.

Diskette Drive Identification

Figure 11-1 identifies the first diskette drive, drive A. The second diskette drive, drive B, is installed below drive A.

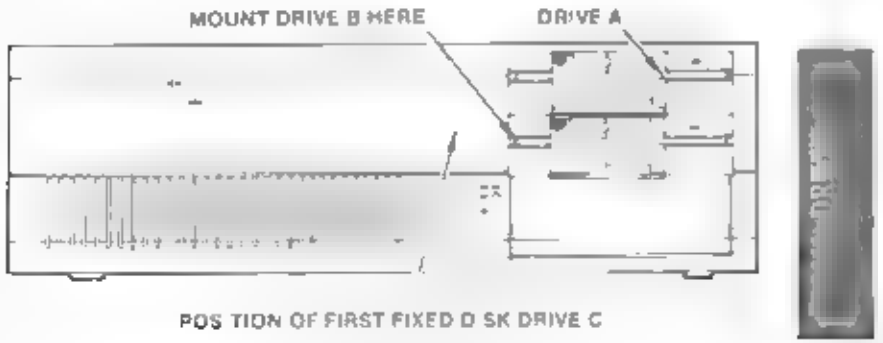


Figure 11-1. Diskette Drive Locations

Two types of 5 ¼-inch diskette drives may be used with your PC: a dual density (2D) diskette drive which reads and writes 360K-byte diskettes, and a high density (HD) diskette drive which reads and writes 1.2M-byte diskettes. The 2D drive reads and writes 48 tracks per inch (tpi). The HD drive reads and writes 96 tpi, and can also read 48 tpi.

The 2D and HD drives look the same except for the surface texture of the indented circle in the lever. Figure 11-2 illustrates the lever difference. The 2D lever has a smooth surface while the HD lever has a meshed (textured) surface. An HD drive is standard as drive A.

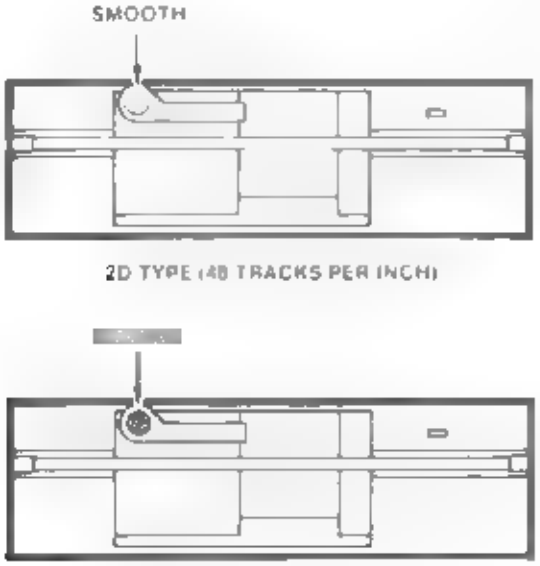


Figure 11-2. 2D and HD Diskette Drive Front Panels

Fixed-Disk Drive Identification

The typical location of the drive type-number label is on the rear of the fixed-disk drive (Figure 11-3). Record the drive types here:

Fixed Disk Drive C:

Fixed Disk Drive D:

These numbers will be used when you configure the system, as explained in Chapter 4.

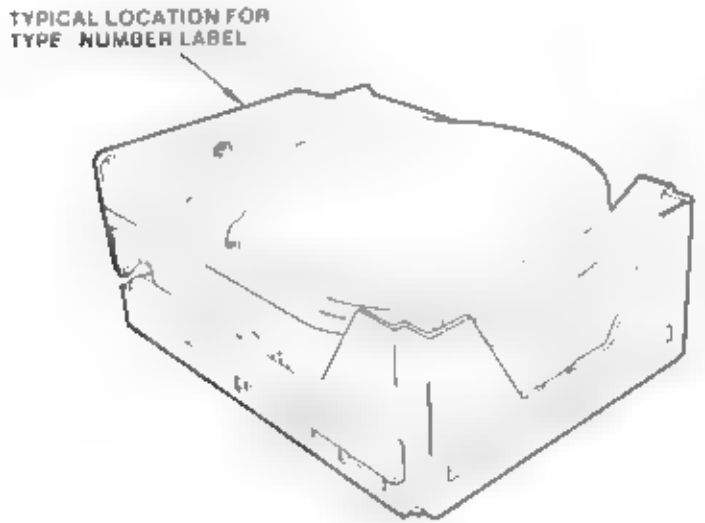
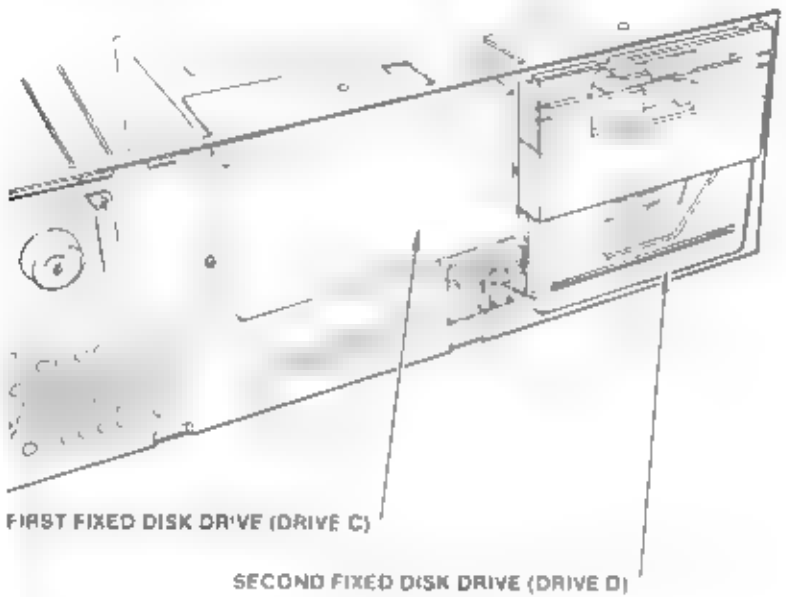


Figure 11-3. Fixed-Disk Drive Type-Number Label

F gure 11 4 indicates where the first fixed-disk drive (drive C) is ocated The second fixed-disk drive (drive D) is ocated below d skette drive A (diskette drive B if installed, must be removed to instal a second fixed-disk drive)



F gure 11 4 Local ' ' ' ixed-D sk Dr ves

11.2. Removing and Replacing System Unit Front Panel

This discussion assumes that the system unit cover has a ready been removed If it has not, refer to section 3.2.

To access either diskette or fixed-disk drives, the system unit front panel must be removed Once the drive installation is com pleted, the front panel must be replaced To accomplish this, perform the following steps.

1 Remove the front panel by removing the three mounting screws that attach the panel top to the chassis (Figure 11 5) T lt the top of the panel away from the chassis, and then lift it up and off

2. To replace the front panel, fit the flanges on the bottom of the panel into the grooves in the chassis. T ghten the mounting screws firmly (Figure 11-5) When putting metal screws into the plastic front panel, be careful not to strip the plastic screw threads in the front panel

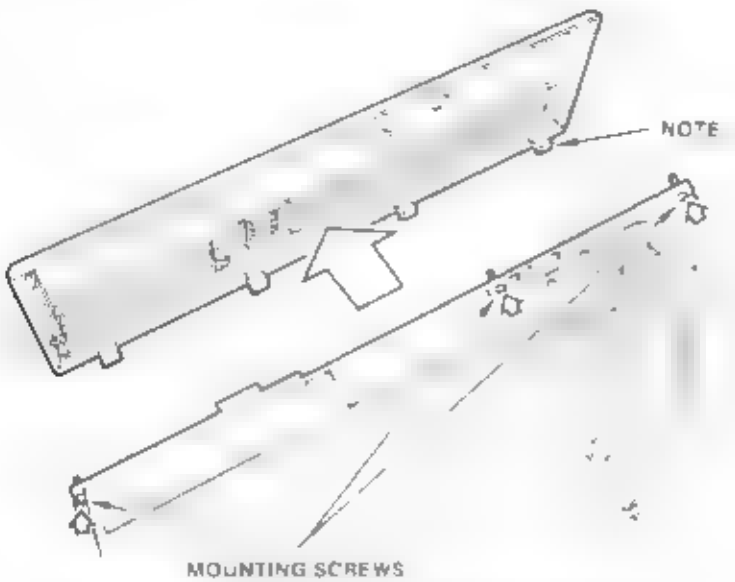
Removing and Replacing Optional Front Panel Cover

If you instal' a device in the bottom position (below diskette drive B) which requires access from the front of the system unit, an optional cover in the system unit front panel may be removed as follows

1 Insert a flat-blade screwdriver into the slot just to the right of the system unit power-on and fixed-disk drive in-use lights. Carefully twist the screwdriver enough to pry the two tabs (on the optional cover) out of the holes in the front panel

2. Using a careful prying motion, move the left edge of the cover toward you until it comes out, and remove the cover

3. To replace the cover, place the two tabs on one end (either end) into the appropriate holes in the front panel, and push the other end into place



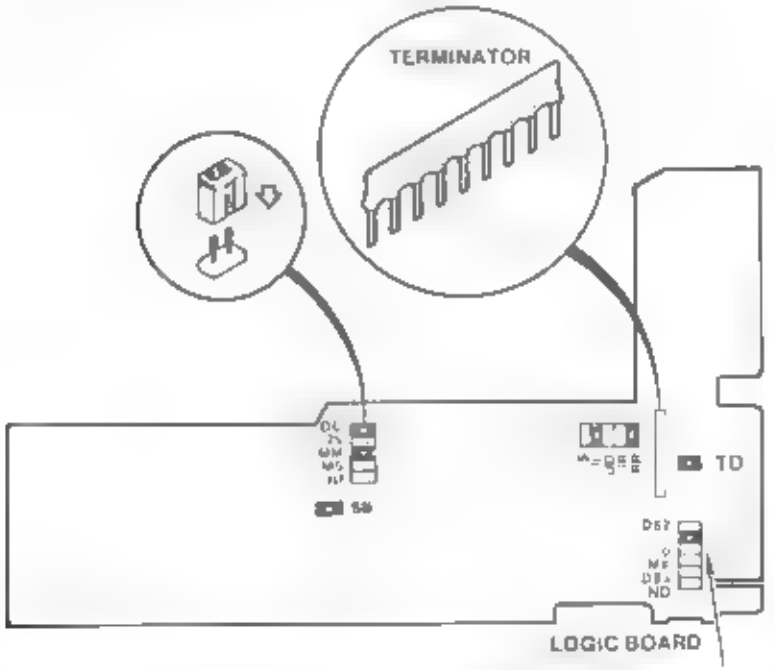
NOTE: THERE ARE PROJECTIONS ON THE FRONT PANEL THAT FIT INTO A GROOVE IN THE CHASSIS

Figure 11-5. Front Panel Removal

11.3. Diskette Drive Installation

Diskette Drive Setup

1. Set the jumper plugs (located on the printed circuit board on the upper side of the drive) in accordance with the diagram in Figure 11-6 for (HD) or Figure 11-7 for (2D).
2. Ensure that diskette drive A has a terminator.
3. If you are installing a diskette drive B, remove the terminator from drive B.



NOTE: ENSURE THAT UNIT NUMBER JUMPER PLUG IS IN POSITION DS1 ON BOTH A AND B DRIVES.

Figure 11-6. HD Drive, 1.2M-Byte Logic Board

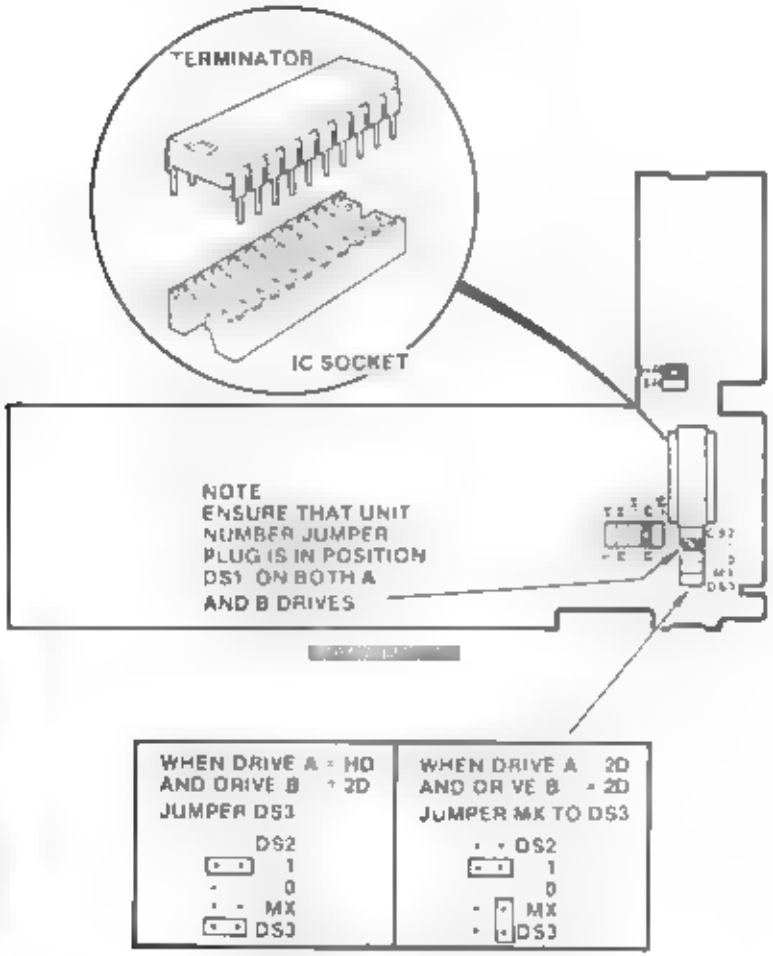


Figure 11-7. 2D Drive 360K-Byte Logic Board

Installing the Second Diskette Drive

1 Remove the diskette drive cover below drive A (Figure 11-8).

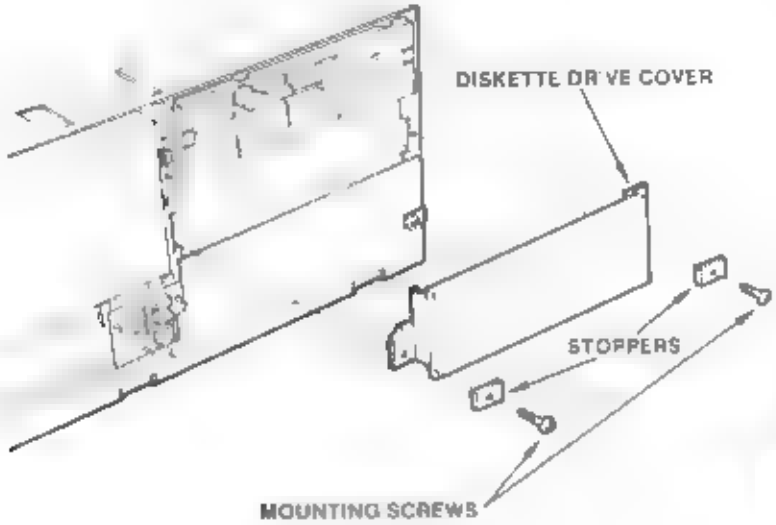


Figure 11-8. Cover Plate Removal

2 Align the rail which is attached to each side of the diskette drive with the groove in the frame. While lifting up slightly, slide the drive in gently (Figure 11-9). Be sure that any cables or wires are out of the way and do not prevent the drive from being fully inserted.

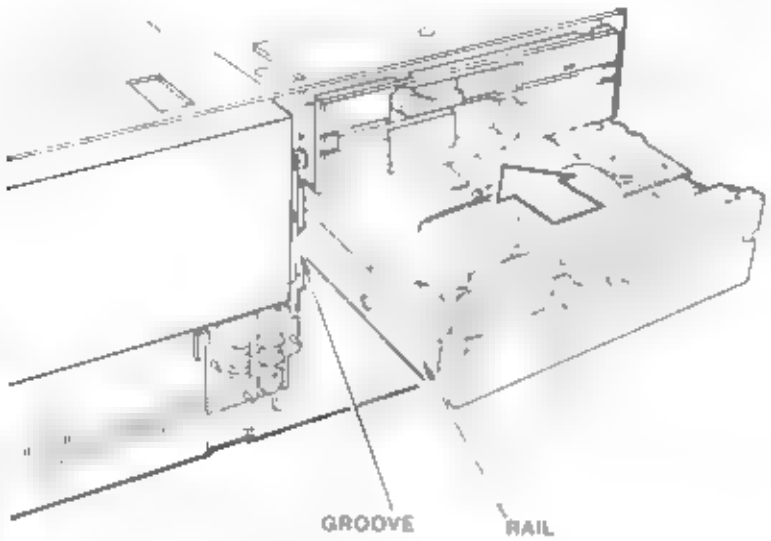


Figure 11-9 Installing the Drive

3. Using the stoppers and mounting screws removed in step 1, fasten the drive securely in place (Figure 11-10).

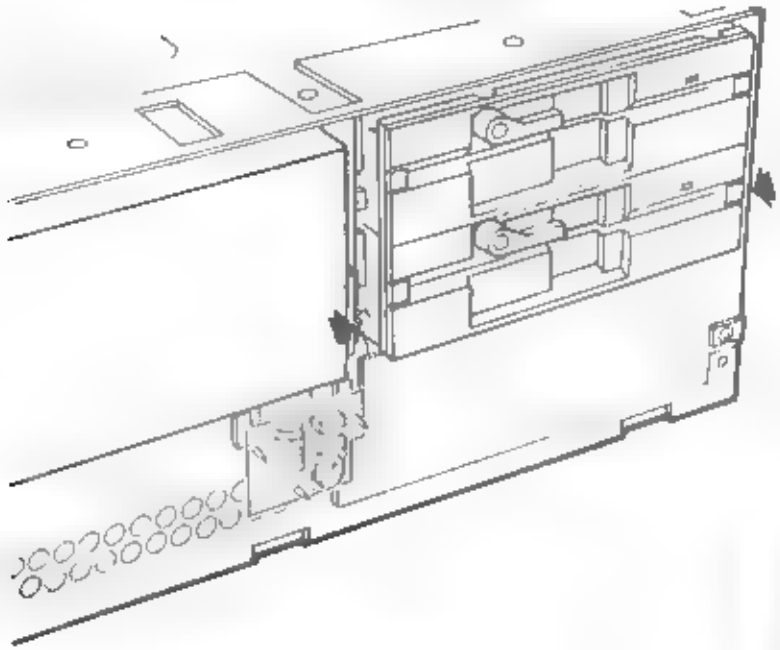


Figure 11-10 Securing the Drive

Cabling

The control cable, power cord, and grounding wire for diskette drive B are provided as standard equipment with the system unit.

1. It may be necessary to slide diskette drive A part way out of its slot in order to attach the cables to drive B. Do this by removing the mounting screws that hold diskette drive A in place, and sliding drive A out approximately 2 inches (Figure 11-11). You can leave all the cables connected.

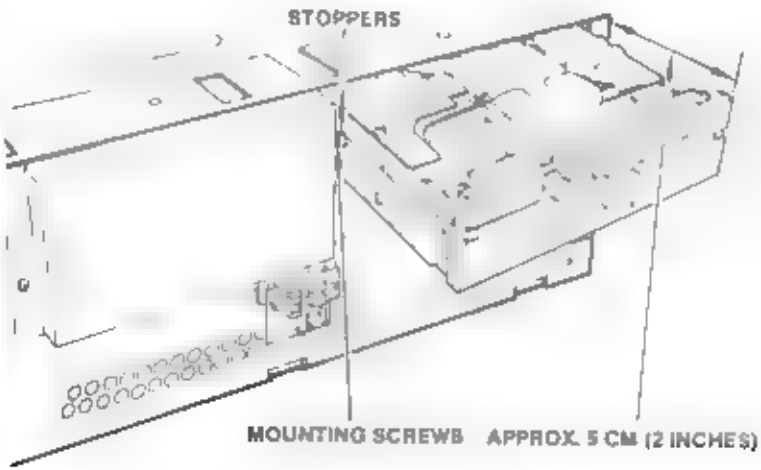


Figure 11-11. Sliding Drive A Forward

2. Attach the wide control cable connector to drive B (Figure 11-12).

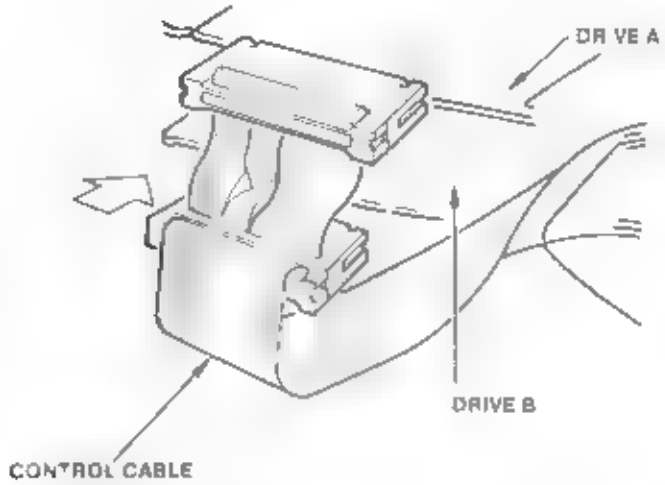


Figure 11-12. Diskette Control Cable

3. A number of multicolored 4-wire connectors come out of the power supply. Attach any available connector to the power connection on drive B (Figure 11-13). The power connector will only attach one way.

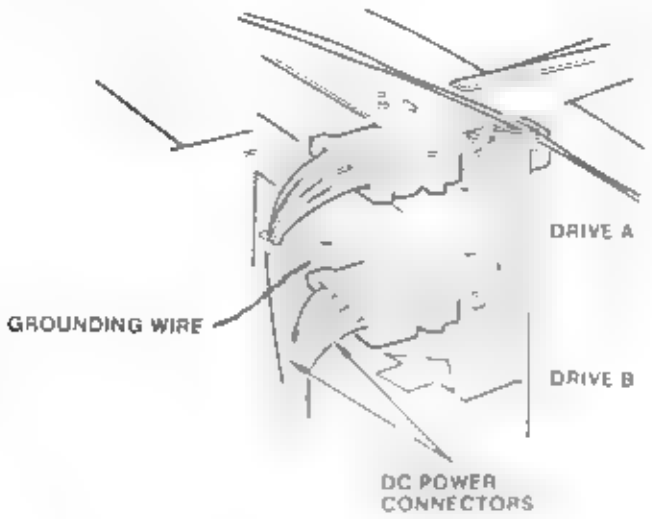


Figure 11-13. Diskette Power and Ground Connection

4. Remove one of the green grounding wires from the spare ground wire tabs (see Figure 2-2 in section 2.2. The spare ground wire tabs are located at the top rear of the chassis that is between fixed-disk drive C and diskette drive A).
5. Attach the green grounding wire by pushing it onto its tab on drive B (Figure 11-13).
6. If diskette drive A is part way out, push it back in and replace the screws.
7. Remove the shipping cardboard from diskette drive B and store it in a safe place for future shipping.
8. If this is the last option to be installed, return to section 3.6. If you have more options to install, go to the appropriate chapter (refer to section 3.5).

11.4. Fixed-Disk Drive Installation

The following diagram shows an example of the location of the connectors and jumper plug at the rear of the fixed-disk drive (Figure 11-14). Before installing the fixed-disk drive, verify that the jumper plug for the drive unit number selection is in position one.

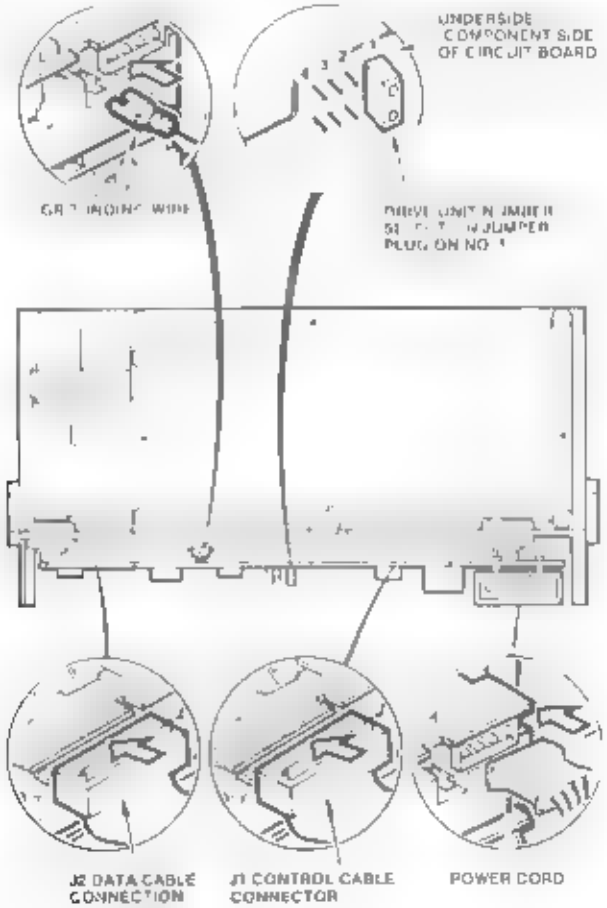


Figure 11-14. Fixed-Disk Drive Connector Locations

Figure 11-15 shows the wide control cable (J1) and the narrow data cable, J2.

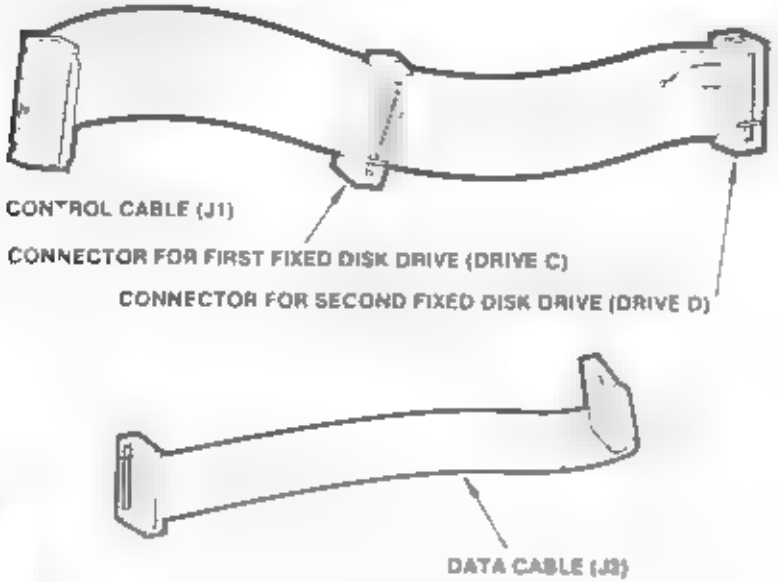


Figure 11-15. Fixed-Disk Drive Data and Control Cables

If the fixed-disk drive is dropped, subjected to vibration, or otherwise roughly handled, the disk may be damaged. Before transporting the drive, follow the instructions in section 11.5.

NOTE

If you have a fixed-disk drive system, the first fixed-disk drive, drive controller, and the control and data cables are already installed in the system unit. Refer to the section on installing the first fixed-disk drive only if you need to remove or replace the fixed-disk drive, controller, or cables. Otherwise, skip to the instructions for installing a second fixed-disk drive in the following section.

Installing the First Fixed-Disk Drive

1. Remove the system unit cover (section 3.2) and the front panel (section 11.2).
2. Remove the plate covering the fixed-disk drive slot to the left of the diskette drive (Figure 11-16).

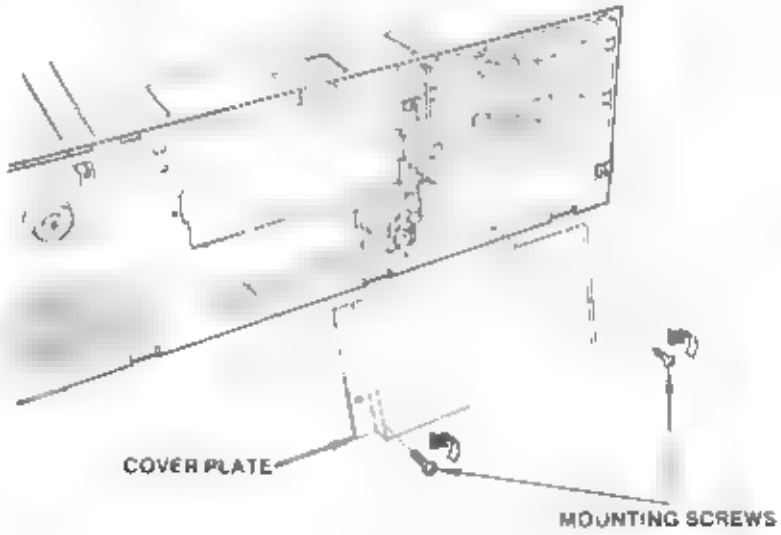


Figure 11-16. Removing the Cover Plate

3 Line up the guide rail on each side of the drive with the groove in the chassis and slide the drive partway into its slot

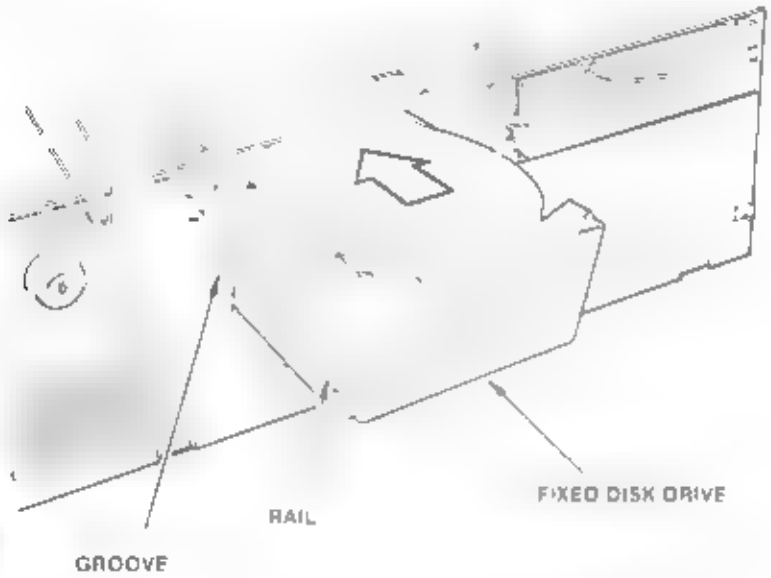


Figure 11-17 Inserting Fixed-Disk Drive C

4 Attach the middle connector on the wide control cable (J1) and the narrow data cable (J2) to the rear of the drive. The red stripe indicates pin 1. The stripe faces the controller boards

5 A number of multicolored 4-wire connectors come out of the power supply. Attach any available connector to the power connection on the drive (Figure 11-14). The power connector will only attach one way

6 Remove one of the green grounding wires from the spare ground wire tabs (see Figure 2-2 in section 2.2. The spare ground wire tabs are located at the top rear of the chassis that is between fixed-disk drive C and diskette drive A).

7 Attach the green ground wire by pushing it onto its tab on the drive (Figure 11-14).

8. Slide the drive the rest of the way in

9. Replace the cover plate and screws, and secure the drive in the chassis (Figure 11-18).

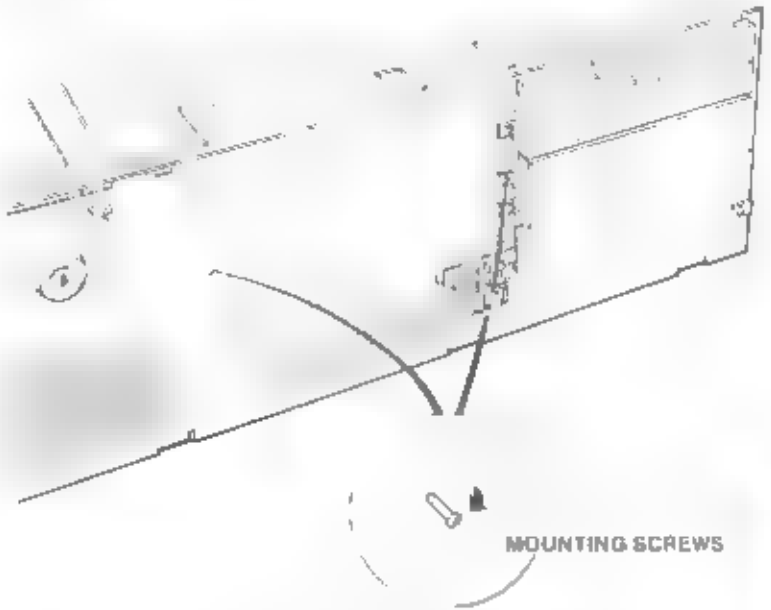


Figure 11-18 Securing the Drive

10 If you have a second fixed-disk drive to install, follow the instructions in the next section. Otherwise, skip to the instructions on installing the fixed-disk drive controller board

Installing the Second Fixed-Disk Drive

1. Locate the connectors on the rear of the drive unit and set the jumper plug as shown in Figure 11–14.
2. Remove the system unit cover (section 3.2) and the front panel (section 11.2).
3. If you have one flexible diskette drive, remove the drive B cover plate (Figure 11–19). Then go to step 5.

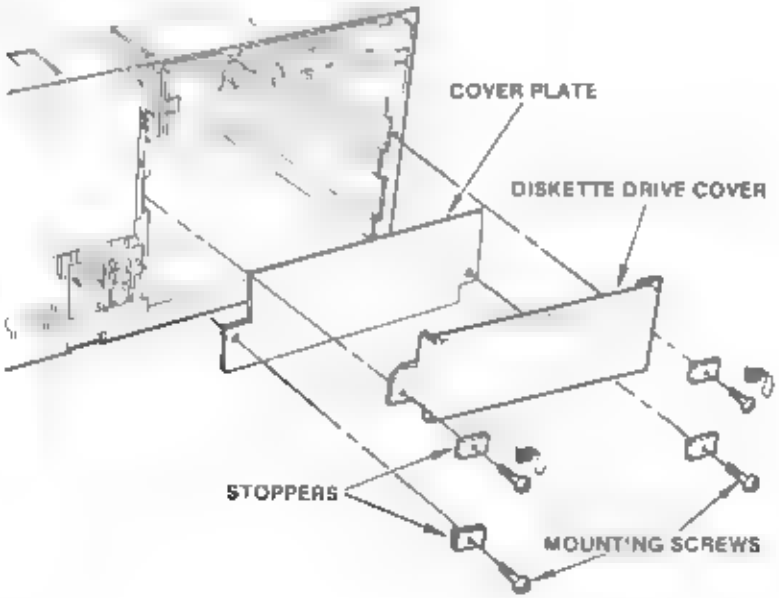


Figure 11-19. Cover Plate Removal

4. If you have two flexible diskette drives, remove the lower diskette drive (drive B). Unhook all cables. Remove the two mounting screws on either side of the faceplate. Slide the diskette drive out of the slot (Figure 11-20).

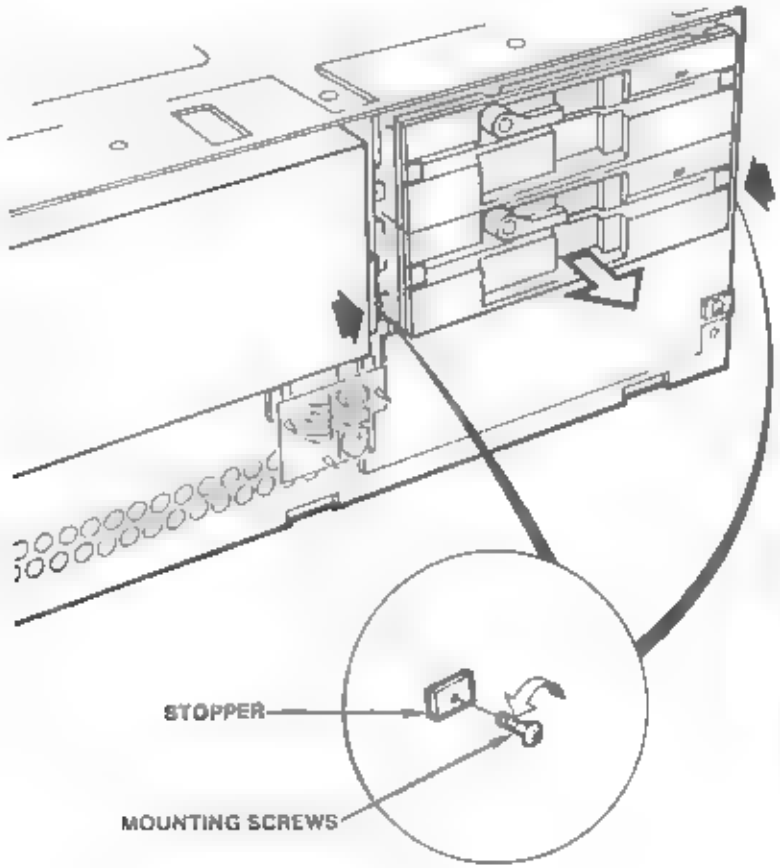


Figure 11-20. Drive B Removal

5. Remove the bottom plate covering the second fixed-disk drive slot (Figure 11-19).

6. Line up the guide rail on each side of the drive with the groove in the chassis, and slide the drive partway into its slot (Figure 11-21).

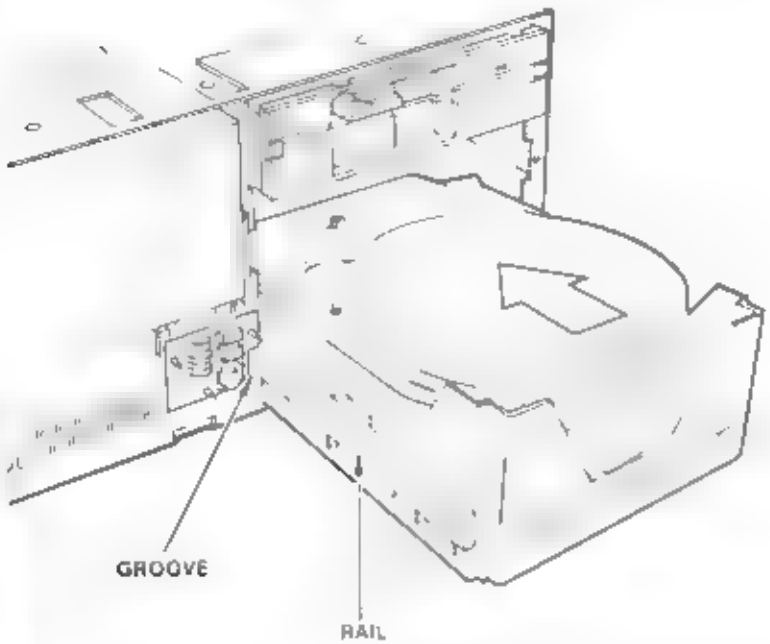


Figure 11-21. Inserting the Fixed-Disk Drive

7. Attach the narrow data cable and wide control cable. The red stripe indicates pin 1. The stripe faces the controller boards (Figure 11-14).

   The last connector on the wide control cable is used for this drive. The narrow data cable attaches to the fixed-disk drive next to the control cable.

   If necessary in order to attach the cables, slide diskette drive A part way out of its slot. Do this by removing the mounting screws that hold the diskette drive in place and sliding the drive out approximately two inches (refer to Figure 11-11).

8. A number of multicolored 4-wire connectors come out of the power supply. Attach any available connector to the power connection on drive D. The connector will only fit one way.

9. Remove one of the green grounding wires from the spare ground wire tabs (see Figure 2-2 in section 2.2). The spare ground wire tabs are located at the top rear of the chassis that is between fixed-disk drive C and diskette drive A).

10. Attach the green grounding wire by pushing it onto its tab on drive D (Figure 11-14).

11. Slide drive B in the rest of the way.

12. Install the diskette drive B cover plate using two of the screws and stoppers removed previously (Figure 11-22).

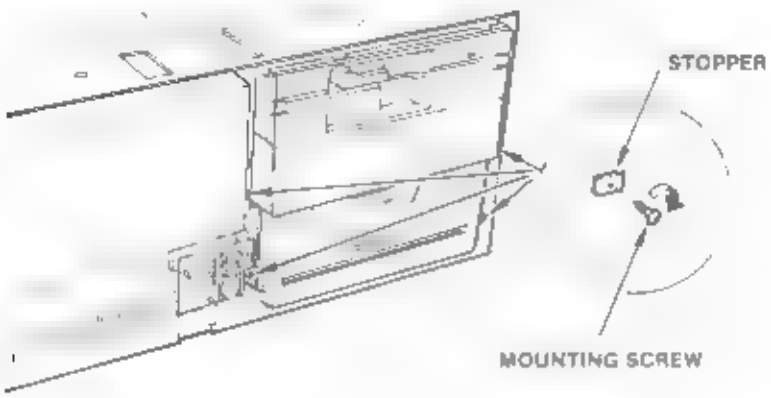


Figure 11-22. Securing the Fixed-Disk Drive

13. If diskette drive A is out, slide it in and replace the screws.

14. If the fixed-disk drive controller board is already installed, continue with this step. Otherwise, go to the section on installing the fixed disk drive controller board. Attach the data cable from drive D to the drive controller board. The red stripe on the cable must face the controller board's edge (Figure 11-23).

15. If this is the last option to be installed, replace the system unit front panel (section 11-2), then return to section 3-6. Be sure to run the SETUP program to configure this fixed disk drive, or drives, into your system. If you have more options to install, go to the appropriate chapter (refer to section 3-5).

Installing The Fixed-Disk Drive Controller Board

1. Remove the metal cover from the rightmost slot (the one closest to the fixed disk drive). If another circuit board is in that position, move that board to another location.

2. Remove the controller board from the antistatic bag.

3. Connect the fixed disk drive in-use light connector to the controller board (Figure 11-23). The connector may be turned either way, but all four pins must line up with the connector.

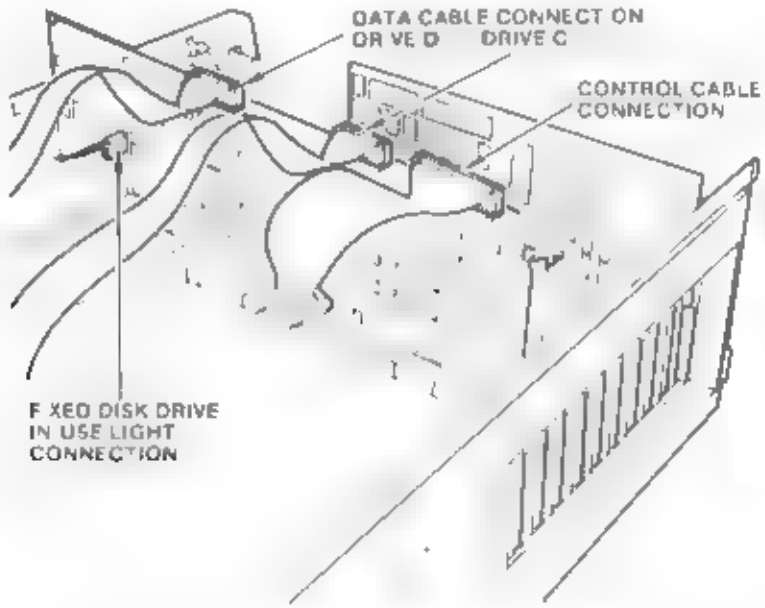


Figure 11-23. Drive In-Use Light and Cable Connections

4 Holding only the edges of the board, carefully push the board straight down so that the bottom edge locks firmly into the connectors on the system board.

5 Using the screw that you removed from the metal cover, firmly tighten the metal bracket to the connector panel (refer to section 2.4).

6 Attach the control cable to the controller board (location J1) as shown in Figure 11-23, with the red stripe on the cable toward the front of the system unit.

7 Attach the data cable for drive C to the controller board (location J2) as shown in Figure 11-23, with the red stripe on the cable toward the front of the system unit.

8. If a fixed-disk drive D is installed, attach its data cable to the controller board (location J3) as shown in Figure 11-23, with the red stripe on the cable toward the front of the system unit.

9 Arrange the cables neatly through the cable retainer so they will not be snagged by the cover when it is replaced.

10 If this is the last option to be installed, replace the system unit front panel (section 11.2), then return to section 3.6. (Be sure to run the SETUP program to configure this fixed-disk drive into your system.) If you have another option to install, continue with the appropriate chapter (refer to section 3.5).

11.5. Moving Fixed-Disk Drives

The diagnostics diskette includes a function that prepares your PC configured fixed-disk drive for moving, by positioning the read/write heads to a safe area. Although fixed-disk drives normally return the read/write heads to a safe area when you turn the system unit off, use this function as a precaution before moving a fixed-disk drive system. As an additional precaution, always copy the contents of the fixed disk to diskette before moving the fixed-disk drive system.

> NOTE
>
> "Moving" means moving the system unit in ways that could severely jostle the unit, such as transporting it by truck or airplane, or tipping it to place it in the floor stand. These precautions are unnecessary if you are shifting the unit from one work area in the building to another.

1. Insert the diagnostics diskette into diskette drive A and press the system reset button, or type DIAGX and press the **Return** or **Enter** key. The following is displayed:

```
Diagnostic Program Version n.nn.n.nn -

<< Components of System >>

SYSTEM BOARD
MEMORY SIZE              nnn KB REAL-    MODE
MEMORY SIZE              nnn KB PROTECT MODE
KEYBOARD
xxxxxxxxx MONITOR
DISKETTE DRIVES          n DRIVE(S)
PRINTER INTERFACE        n UNIT(S)
                         n UNIT(S)
                         n DRIVE(S)

Is this list correct? (Y/N)
```

2. Enter Y (yes, the list is correct). The following prompt appears

3. Enter Y (yes). The heads of the fixed-disk drive will be positioned to a safe area. When the process is complete, you will hear a continuous beep and the following prompt will be displayed

4. Turn off the system unit power. You can now safely move the PC

Appendix B. Switch Setting Summary

This appendix provides a summary of the PC switch settings and memory maps. Also included at the end of this appendix is a blank SW1 system board switch chart for you to fill in your particular SW1 settings for future reference.

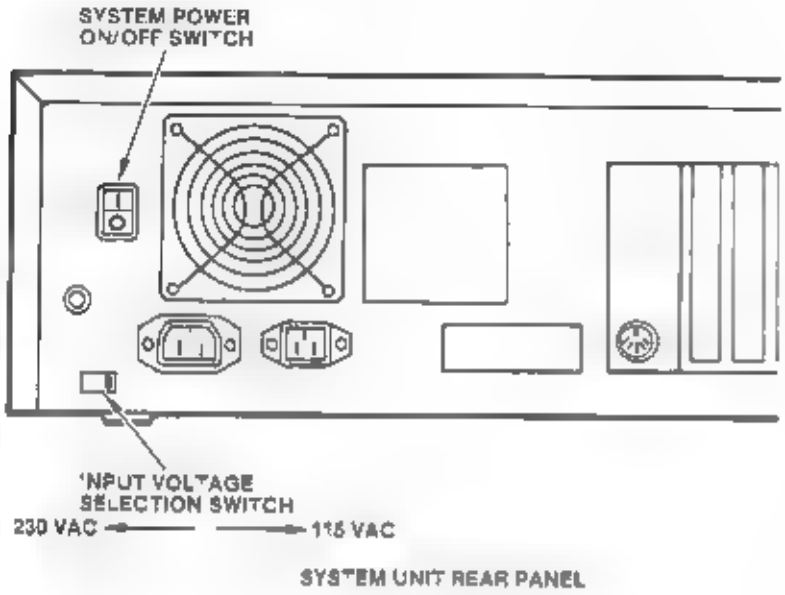


Figure B-1 Setting the System Unit Voltage Switch

CAUTION:

Ensure that the input voltage selection switch is set for the correct voltage. If the switch is set to 115 VAC when the system is connected to a 230 VAC electrical outlet, the system unit's internal power supply may be damaged when you turn on the system. For safety, the manufacturer sets the input voltage select on switch to 230 VAC.

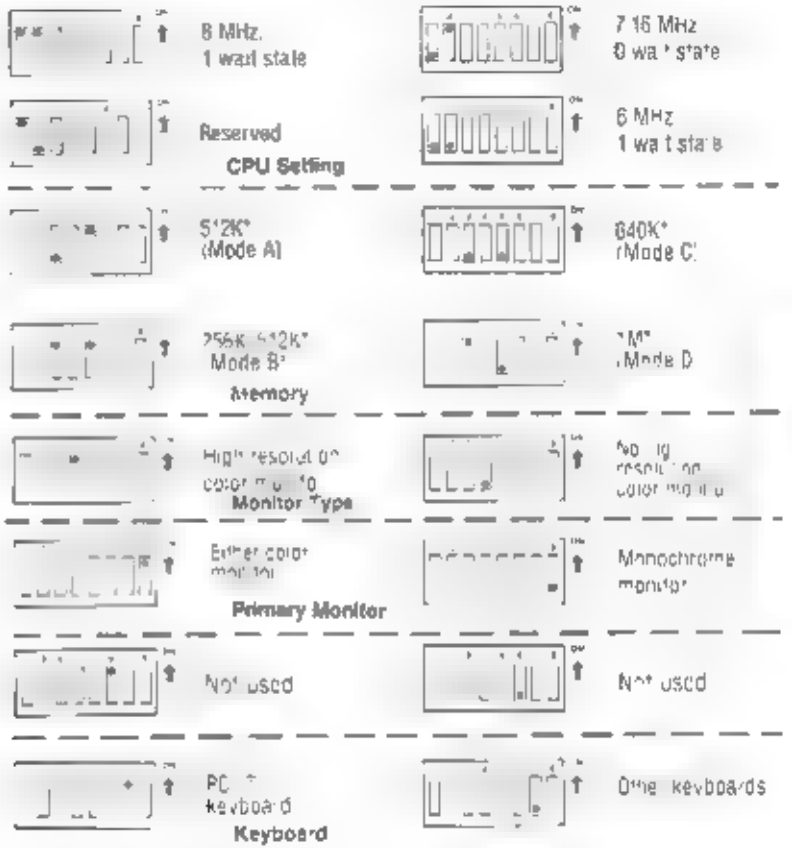
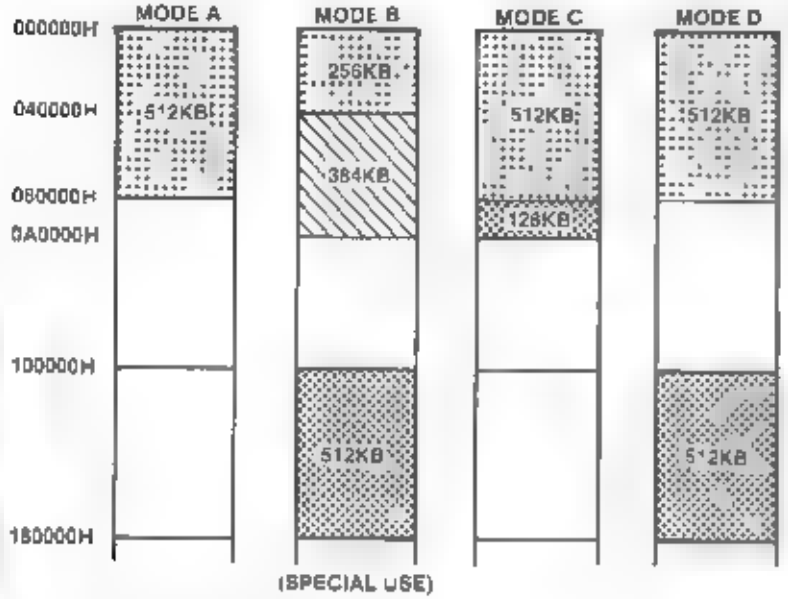


Figure B-2. System Board SW1 Switch Settings

*Refer to section 7.2 for additional information on memory switch settings. (SW1-5 On/Off = JP2 On/Off.)



SW1-5 (JP2)	SW1-3	
	OFF	ON
OFF	MODE C	MODE D
ON	MODE A	MODE B

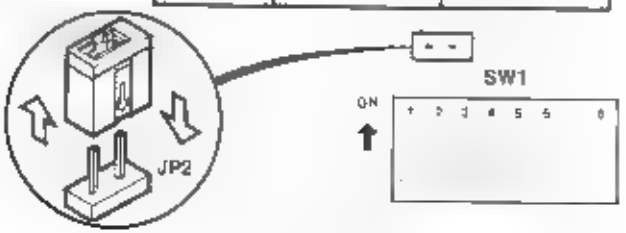


Figure B-3. Memory Mapping

Table B-1 Setting Memory Address Switches

JP2/ SW1-5	SW1-3	System Board Memory	Base Memory Set up	Memory Expansion Boards	Expansion Memory Set Up	Note
ON	OFF	512K	0	0 1 2	0 2 4	1
OFF	OFF	640K*	1	0 1 2	0 2 4	1
OFF	ON	1M*	0	0 1 2	0 5 2 5 4 5	2
ON	ON	256K 512K**	1	0 1 2	0 5 2 5 4 5	2

* Requires 1M byte in chips on the system board

** Must have 1M byte in chips on the system board before expansion boards can be added

Note 1 Expansion board address registers at 1M byte
Note 2 Expansion board address registers at 1.5M byte

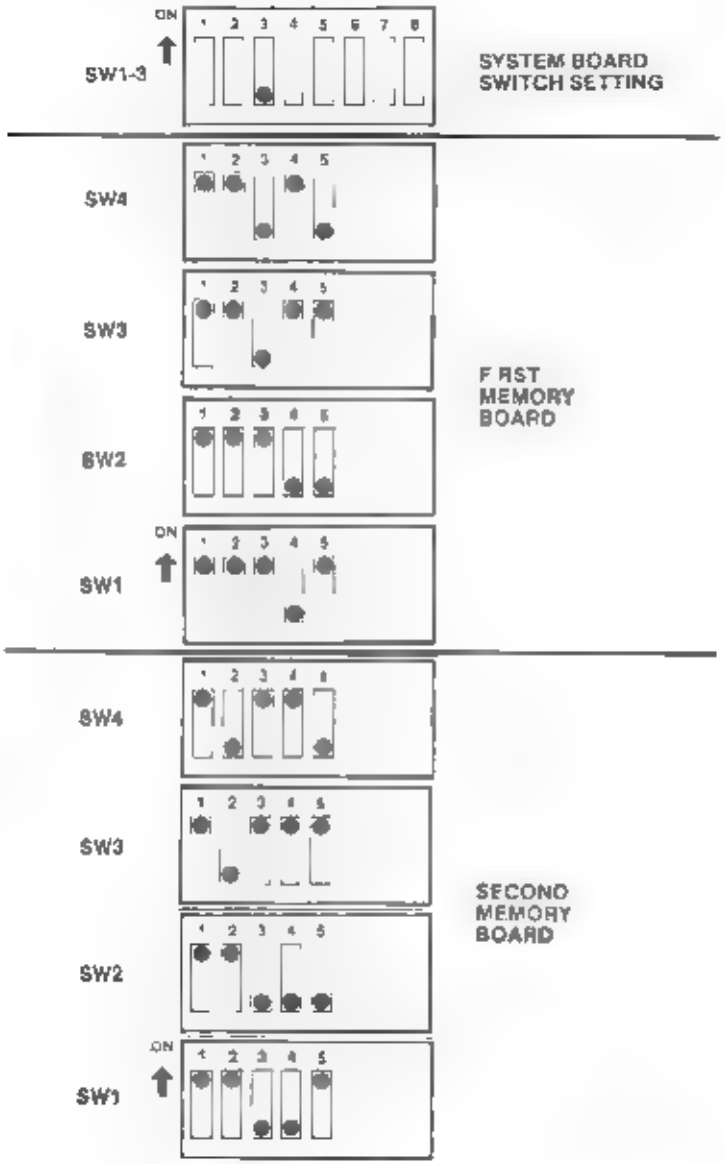


Figure B-4. Memory Board Switch Setting When SW1-3 is OFF

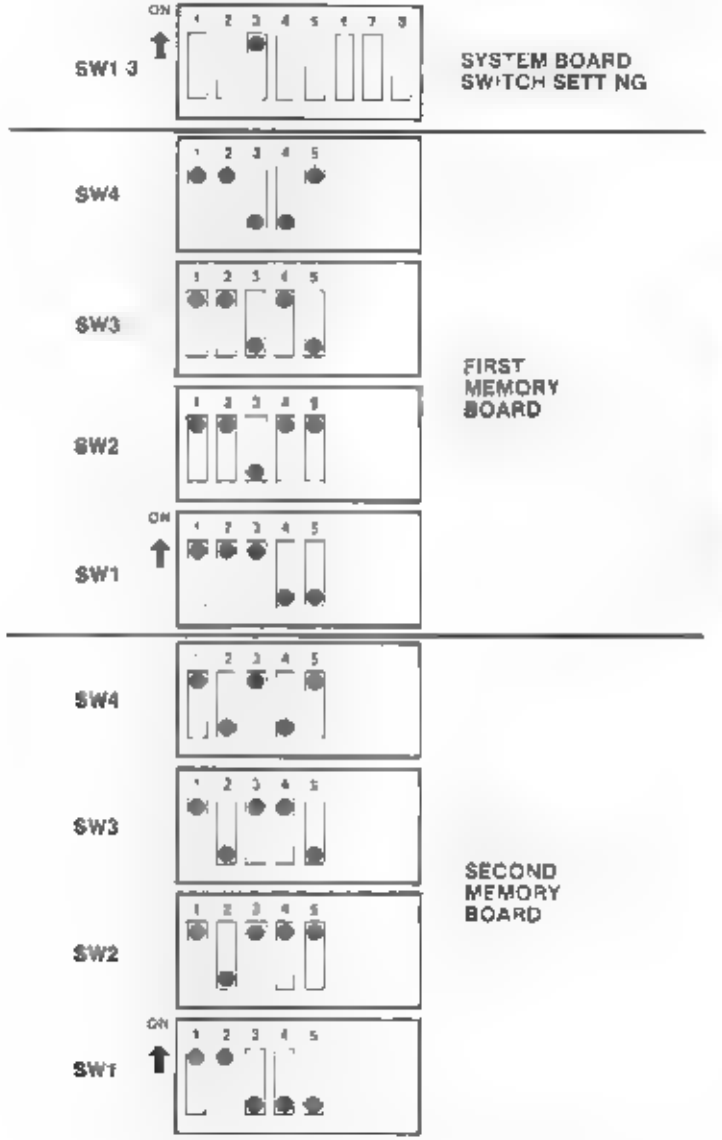


Figure B-5. Memory Switch Setting When SW1-3 is ON

Table B-2 Memory Board Address Settings

Microswitch Settings					
1*	2	3	4	5	Address
ON	ON	ON	ON	ON	Do not use
ON	ON	ON	ON	OFF	Do not use
ON	ON	ON	OFF	ON	1024 KB 1536 KB *
ON	ON	ON	OFF	OFF	1536 KB 2048 KB
ON	ON	OFF	ON	ON	2048 KB 2560 KB
ON	ON	OFF	ON	OFF	2560 KB 3072 KB
ON	ON	OFF	OFF	ON	3072 KB 3584 KB
ON	ON	OFF	OFF	OFF	3584 KB 4096 KB
ON	OFF	ON	ON	ON	4096 KB 4608 KB
ON	OFF	ON	ON	OFF	4608 KB 5120 KB
ON	OFF	ON	OFF	ON	5120 KB 5632 KB
ON	OFF	ON	OFF	OFF	5632 KB 6144 KB
ON	OFF	OFF	ON	ON	6144 KB 6656 KB
ON	OFF	OFF	ON	OFF	6656 KB 7168 KB
ON	OFF	OFF	OFF	ON	7168 KB 7680 KB
ON	OFF	OFF	OFF	OFF	7680 KB 8192 KB
OFF	ON	ON	ON	ON	8192 KB 8704 KB
OFF	ON	ON	ON	OFF	8704 KB 9216 KB
OFF	ON	ON	OFF	ON	9216 KB 9728 KB
OFF	ON	ON	OFF	OFF	9728 KB 10240 KB
OFF	ON	OFF	ON	ON	10240 KB 10752 KB
OFF	ON	OFF	OFF	ON	11264 KB 11776 KB
OFF	ON	OFF	OFF	OFF	11776 KB 12288 KB
OFF	ON	OFF	ON	OFF	10752 KB 11264 KB
OFF	OFF	ON	ON	ON	12288 KB 12800 KB
OFF	OFF	ON	ON	OFF	12800 KB 13312 KB
OFF	OFF	ON	OFF	ON	13312 KB 13824 KB
OFF	OFF	ON	OFF	OFF	13824 KB 14336 KB
OFF	OFF	OFF	ON	ON	14336 KB 14848 KB
OFF	OFF	OFF	ON	OFF	14848 KB 15360 KB
OFF	OFF	OFF	OFF	ON	15360 KB 15872 KB
OFF	OFF	OFF	OFF	OFF	15872 KB 16384 KB

* Do not use if SW1-3 on the system board is ON

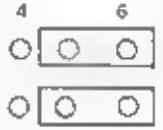
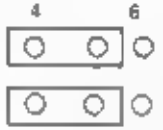
	JUMPER PLUG (J5) INSTALLATION	PORT NO.	I/O ADDRESS (HEX)	INTERRUPT ADDRESS
FIRST BOARD		3	400 — 407	440
		4	410 — 417	
		5	420 — 427	
		6	430 — 437	
SECOND BOARD		7	408 — 40F	448
		8	418 — 41F	
		9	428 — 42F	
		10	438 — 43F	

Figure B-6 Multiterminal Adapter Board Jumper Plug Installation

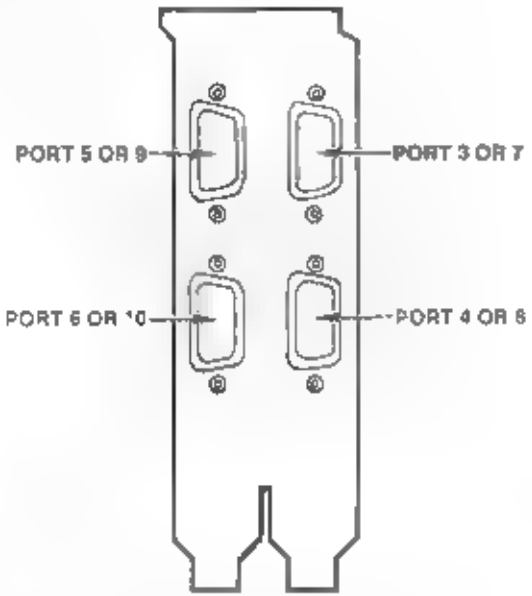


Figure B-7 Multiterminal Adapter Board Port Numbering

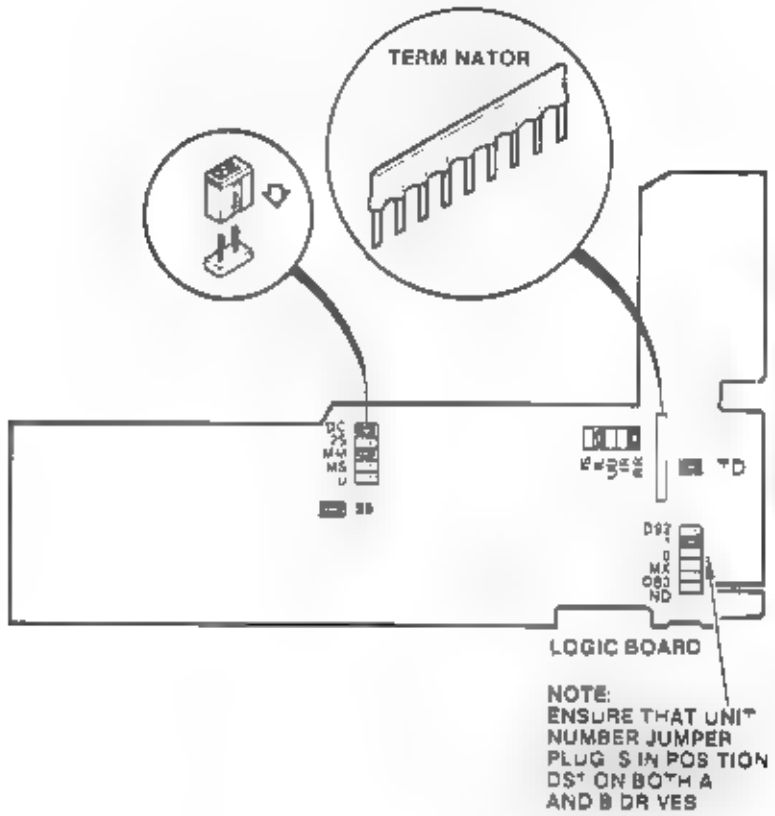


Figure B-8. HD Drive 1 2M Byte Logic Board

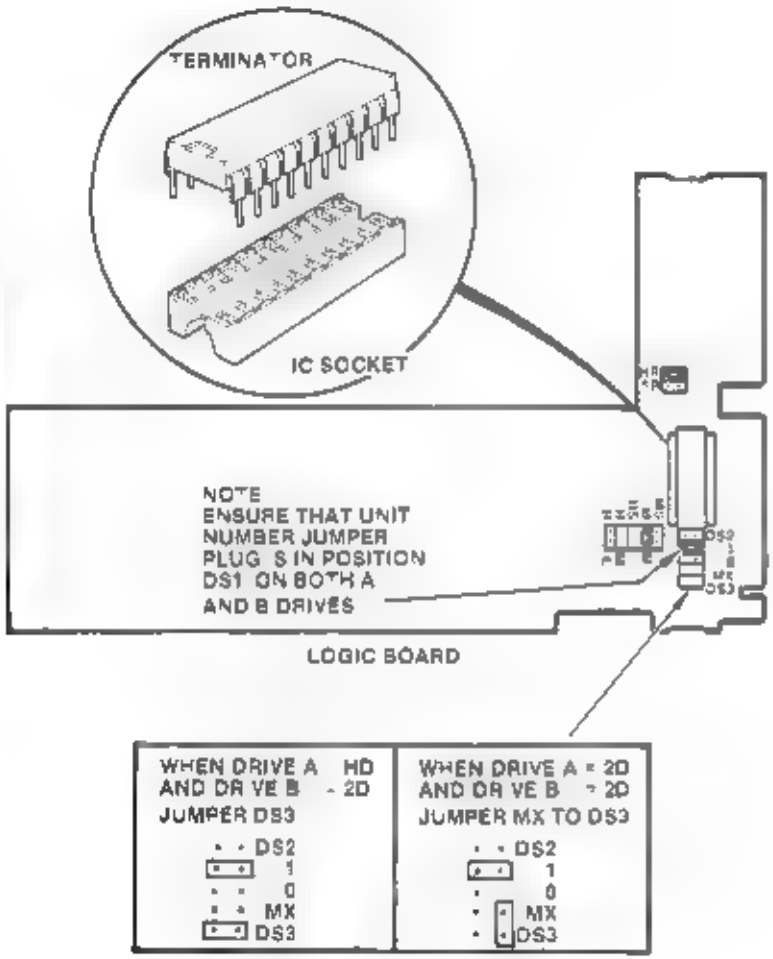


Figure B-9. 2D Drive 360K Byte Logic Board

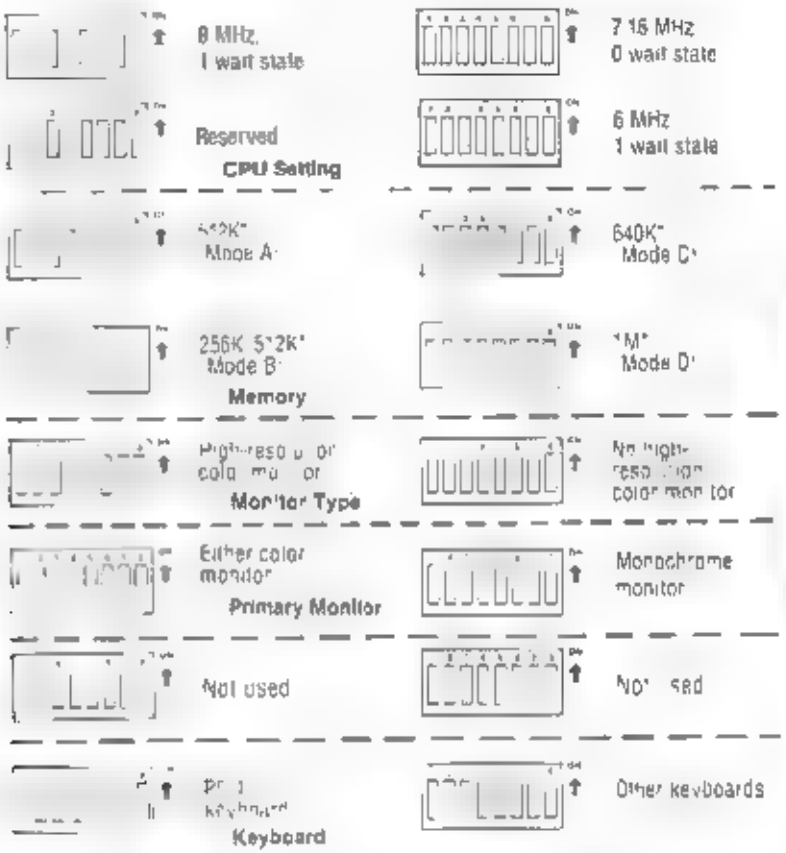


Figure B-10. My PC System Board SW1 Switch Settings

**Refer to section 7.2 for additional information on memory switch settings. (SW1-5 On/Off = JP2 On/Off.)*

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